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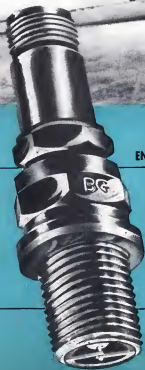
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DOMESTIC

Allowable gross takeoff weight of Subsonic B-70 Super Aardvark seven DC-4 Douglas has been increased from 70,700 lb to 71,800 lb SWA claims it is carrying 1,040 lb more per trip on the Pacific route than its nearest competitor and 1,800 lb more than the average for all others. Its payload weighs from 12,600 lb to 15,075 lb, depending on route.

First routine morning landing and takeoff in New York was made by Port of New York Authority's new Jet 47-101 first-equipped copter on May 31 using new helipad atop the 16-story FNYA building. Copter initial flight was inspection trip of Authority's construction progress.

Charles F. Blair made first single engine plane flight across the North Pole when he flew from Rorua, Norway, to Fairbanks, Alaska, covering 3,800 miles in a converted North American P-51 Mustang. He later left Fairbanks to fly nonstop to New York. Total flight time from Rorua to New York 15.5 hours and 15 hr, 57 min. Blair is a Pan American World Airways pilot.

U. S. aviation firms paid flight to give medals \$2,178,000 in royalties and license fees during 1970 for building British-designed jet engines, states Chas. E. H. of the Lockheed Aircraft Corp. in the House of Commons. He also noted that earnings for 1971 would show "basic success" over 1970.

Carroll Wright entered prop blades have been ordered by KLM Royal Dutch Airlines for installation on its new Super Constellation scheduled for delivery in 1972, also by the USAF "in substantial numbers" for the jet-engine Douglas C-124 Globemaster II. It is getting the new blades for the turboprop C-124H. The KLM also is the first commercial airline contract for the blades.

United Air Lines DC-6s now still powered first week in ports referred to fly them without increased flight pay over that for regular DC-6. UAL claims the missing wage contract covers the DC-6. Plans say so. This week has UAL on the middle of an equipment shortage. June 3 was a record traffic day for UAL—6,112,000 revenue passengers miles flown.

14 Gen. Kenneth B. Woff, USAF Deputy Chief of Staff, Materiel

and top procurement officer of the Air Force will retire effective June 30. He served in possible successors are: 1st Assistant Deputy Chief of Staff, Materiel, Carl A. Smith and Maj. Gen. David A. Cook, Director of Procurement and Industrial Planning, AFMC.

FINANCIAL

Douglas Aircraft Service, Inc., Wood Dale, N. Y., has declared a 30 percent stock and 5 percent cash dividend, the former to be paid June 15 to holders of record June 5 and the latter payable July 15 to holders of record July 10.

Northrop Aircraft, Inc., has earned approximately \$2,115,000 in the first nine months of the current fiscal year, with associated earnings for the third quarter approximating \$1,004,000. Sales for the current first nine months total \$69.5 million. Backlog now stands at approximately \$100 million and allows for P-50 fighter production into 1971.

INTERNATIONAL

Lord Groom has been named new Minister of Civil Aviation in Britain, succeeding Lord Pitt Rivers, whose new post is Vice Lord of the Admiralty.

DRH Constable made 2,414-mile flight from London to Guam in 5 hr 32 min carrying 25 passengers. One stop was made in Kona. This was the Constable's first overseas flight—ordinarily by BOAC, which has it on loan from the Ministry of Supply. BOAC had about 120 hr flight time on the plane prior to this flight.

Aero Canada CR-108 powered by two Aero Canada Orenda turboprops is to fly shortly. The company also expects to have its first production Orenda completed shortly and in service. Heated that new projects were "raining in like shape." At the same time Aero Canada announced the flight of the Orenda-powered North American P-60A from Toronto to Montreal at an average speed of 665 mph. The Super-C Orenda has been in operation 190 hr without overhaul.

Lucas R.E. 36 is being offered to shatter a new world altitude record for lightplanes. It is personally established a mark of 7,755 m, later broken by a Piper lightplane (5,775 m). The R.E. 36 is getting a 75-hp Model engine in place of its 65-hp Zundapp and hopes to get to 18,000 ft, the altitude.

for faster construction of faster planes

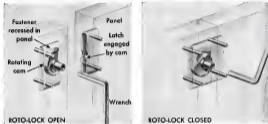
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Easily controlled by unskilled labor in any material, this revolutionary Simmons fastener is ideal for any type of demountable construction—from Army shelters or temporary hangars to lightweight knock-down shipping boxes, desks or tables. Releasing completely, Roto-Lock leaves no

exposed parts when closed. It will fasten in mangled conditions.

Built of materials highly resistant to corrosion and wear, Roto-Lock features design simplicity, has no springs or other delicate mechanisms affected by severe climates. Furthermore, showing numerous Roto-Lock applications and complete design specifications, is available to help you solve your fastening problems. Write for it today.

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Washington Roundup

U.S. Joint Chiefs of Staff face three different answers to the fundamental military questions. What size and type striking force should we have to deter an all-out war, but be able to meet the challenge if it comes? How fast should it be built up? The answers were given at the committee hearings on our foreign policy and the role of MacArthur.

Vandenberg: More Air Power

Gen. Hoyt Vandenberg, USAF's Chief of Staff, said it this way: More air power is needed quickly and later.

- The present status of the Air Force: "A shooting force," incapable of meeting our global responsibilities.
- The planned USAF build-up: Inadequate, both as to ultimate goal—a 95-wing force—and the rate planned to reach it.

- A 55-wing Air Force, Vandenberg stated, should be only a "war skeleton" on a build-up to a greater USAF. What USAF finally wants is a 130-wing strength.
- To Sen. Ladd (Illinois's question): "Are you satisfied with the rate of progress on our air commitment program?" Vandenberg replied: "No, sir."
- The defense to war: As an all-out strategy, it aims to demonstrate an aggressor at the check of the atom.

Collins: More Tactical Air Power

Army Chief of Staff, Gen. Lemuel Collins, takes a middle-ground position. The U.S. today does not have the military strength to meet an all-out war. But he is not ready, "by and large," the U.S. is attaining that strength "as rapidly as we should."

"So far as the Army is concerned, certainly," he commented, adding off any need for greater or speedier build-up in ground forces.

Pressed by Sen. Hiram Child Lodge, Collins volunteered that the war weak spot in the program was lack of tactical aviation for support of ground forces in Europe. More tactical air power is urgently needed for deployment to the Continent, Collins said, but, he added, the information given him was that USAF was developing additional tactical groups as fast as production facilities permit.

Sherman: More Ground Forces

Chief of Naval Operations, Adm. Forrest Sherman, was the committee's top optimist: witness—the only member of the Joint Chiefs of Staff who said he was completely satisfied with the administration's military build-up program, completely satisfied that the U.S. could meet an all-out war tomorrow.

The gift of his testimony—Navy stands ready, in all conditions, to meet any global challenge: "I am, without hesitation, to be the first officer man to say that he has enough force to do everything he might be called upon to do, but..." Sherman trusted his optimistic report. He added: "I think that the Navy is what has been accomplished all Korea has demonstrated that it is ready to fight."

He, Sherman said, he didn't question as did Vandenberg the administration's "75 percent better and 30 percent good" program. He was willing, he said, to accept the demands of "higher efficiency" so in how much of the national economy should be devoted to military production.

Pressed by Lodge, Sherman finally made three points:

- "Many" of his advisors think the Navy should go

"faster and faster" under the "emergency" build-up to meet its possible commitments.

- "Continuity with respect to us," the administration's build-up is "as rapid as can be accomplished with efficiency." This was a direct challenge of the testimony of USAF's Vandenberg, said, to a lesser extent, of Army's Collins, who reported lack of fuel on the weak link in the defense program.

- If anything, the build-up in ground forces might be stepped up—advice that angered both Air Force and Navy officials. It came on the heels of Collins' report that "at least the Army program recently is adequate."

"I believe we could make more rapid progress in building up and preparation of ground elements. I don't think that has been true in the past, and I believe in the next few months we are going to have to re-evaluate again... whether we should add to them."

The principal deterrent to war, Sherman says, is not an all-out strategy strategy, as was, in Vandenberg's declared, but "a proper employment of all those of our armed resources, coupled with the residual capacity of the country."

A Pearl Harbor Air Arm?

Adm. Sherman's optimism seems to be an oversight: development.

The Navy air strength which Sherman testified was ready and able to meet any challenge any place in the world is less than the Navy air strength he characterized not but all at approximately the level of "the Pearl Harbor Naval Air fleet."

Last Oct. 2, in a statement before the House Armed Services Committee, Sherman stated that the adequacy of the Navy air build-up approved by the Joint Chiefs of Staff. It would mean a striking Naval air arm by the end of '51 only approximating that in being on Pearl Harbor day, he told startled congressmen. On Dec. 3, 1941, he reported, the Navy had 5,243 aircraft in the regular Navy. Under the JCS program, the Navy will have only 5,690 by the end of 1951. (It is called the 3,535-plane program, because, in addition to the 5,690 aircraft in the regular Navy, it includes 1,544 aircraft in the Naval Reserve ready for duty.)

- But there won't be even a 7,015-plane Naval fleet by the end of 1952. Navy has never been given funds for it. Last August, following the outbreak in Korea, Secretary of the Bureau of Aeronautics, Rear Adm. A. M. Price, testified that requests for 2,612 new planes must be promptly filled by the 7,015-plane goal by the end of 1951 were to be met. Navy was then given money for 2,577 new planes—155 less than the requirement for the 7,015-plane striking force which Sherman had emphasized in "A Pearl Harbor Naval Air Arm."

- Although almost a year has passed and a national emergency has declared, the Navy to date has not been given funds for the 415-plane deficiency in the 7,015-plane program. Sherman has not insisted on obtaining the funds.

—Katherine Johnson



ROUTE STRUCTURE of Slick cluster routes, set by Navy to meet its supply needs, contributes to the new 100 percent load factor

Profitable Cargo at 11 Cents a Ton Mile!

Slick's daily coast-to-coast Navy service sets pattern for a commercial operation.

The controversial question—whether it is possible to haul air freight profitably at a rate lower than the present floor of 15 cents a ton mile—has been settled after day in the fat haulage of Slick Airways' C-46s and a coast-to-coast shuttle.

The cargo carrier is hauling freight for 11 cents a ton mile—and at some outstandingly cheaper than it can be carried by truck.

This feat is being accomplished on a Navy charter service, but a charter service with aircraft adaptable to regular overseas overseas commercial operations.

The Navy-Slick service leads to two significant conclusions:

• With high load factors and utilization rates, it is possible, at least in some cases, to operate profitably below the 15-cent rate set by the Civil Aeronautics Board several years ago.

• Government planes are profitable when they fly on a 60 percent load factor and five and one-half hours daily utilization for cargo planes in slugging up their mobilization proposals. The Navy-Slick fleet figures are consistently meeting 100 percent and daily utilization figures about nine hours.

The key to the Navy-Slick low-cost operation has been their phenomenal load factor and high utilization. And the load factor is achieved because the Navy acts as a "flight coordinator," a role that in commercial operations could be filled by a freight forwarder with access to all offices.

And the Navy cluster system could be used by large companies with heavy freight movements to widespread points. It is understood that some companies may shortly study the open idea.

A hectic departure from standard air freight patterns characterizes the Navy

Slick operation, and has a great deal to do with its success. It is that:

The shipper (the Navy) controls the movement of the aircraft and the schedule. As a Slick executive explains, it is generally the carrier that determines such control. The shipper asks whether the carrier can load and unload a load, and the carrier sends to the shipper the freight rate schedule. For the Slick service, the Navy determines when the plane will be loaded, where it will fly and when it will carry.

A statistic at how this works is that Slick has never rescheduled a flight, and the Navy has had negligible loss or damage.

• Cost Savings—There are some tangible results of the Navy-Slick collaboration: • As two take-out to the Navy for April, using Slick charter, averaged 11.2 cents.

• Mail carriers two take-out to the Navy for April averaged 11 cents.

• Navy pays \$6.62 a ton by air between New York and Philadelphia.

• Navy pays \$10.23 a ton by third-class truck between New York and Philadelphia. This explains its operating on a

What It Costs to Ship Navy Freight

(Cost of shipping one ton one way)

	MONTHLY AVERAGE		MONTHLY AVERAGE		MONTHLY AVERAGE	
	JULY 1950	JULY 1951	APR. 1950	MAY 1951	APR. 1951	MAY 1951
Mailbox delivery	1.00	1.00	1.00	1.00	1.00	1.00
Mailbox delivery	1.00	1.00	1.00	1.00	1.00	1.00
Mailbox delivery	1.00	1.00	1.00	1.00	1.00	1.00
Mailbox delivery	1.00	1.00	1.00	1.00	1.00	1.00
Mailbox delivery	1.00	1.00	1.00	1.00	1.00	1.00

*May 1951 average for July 1950.

Source: Aviation Week

Time and Cost N. Y.—San Diego

(By N.Y. to San Diego)

	1947	1950
Mailbox delivery	1.00	1.00
Mailbox delivery	1.00	1.00
Mailbox delivery	1.00	1.00
Mailbox delivery	1.00	1.00
Mailbox delivery	1.00	1.00

*By air, 1947 to 1950.

Source: Aviation Week

daily schedule for which the Navy pays, whether the plane is filled or not, is a charter for the Navy to fly anything other than its mail.

• Navy used 15,000 tons of cargo, using Slick charter, during eleven sample days checked last August and September. • Korea freight—The Navy-Slick arrangement was started last summer as a temporary operation to meet stepped-up demands of the Korean conflict. The original rate was 52 cents a plane mile. It is now 70 cents a plane mile, which gives Slick a satisfactory margin of profit and the Navy low-cost 24-hour delivery from coast to coast.

Slick flies seven scheduled and three extra-coast transcontinental coastal trips a week, using five or six airplanes. The service is scheduled so that Slick begins the service, anywhere per load, as calculated at 10,000 lbs. Now it is figured at 13,000 lbs.

Transit points are Newark in the east, and Oakland in the west. Slick planes pick up and deliver cargo at Philadelphia, Washington, Norfolk, San Diego and Burbank. Drop-offs are at Dayton, Chicago, Kansas City, Annapolis and Florence.

• Navy Control—Navy sets up the route as the basis of its supply needs. The Navy air traffic division of the Bureau of Supplies and Accounts controls the entire operation, working closely with Slick representatives at each loading and unloading point.

Urgent priority cargo is loaded first for the transcontinental flights. Then the transcontinental flights are filled out with lower priority freight. For instance, because the Navy has 5,000 lb. of transcontinental cargo at Norfolk, that goes on first, leaving 10,000 lb. capacity available from Norfolk to Philadelphia. Philadelphia has 1,000 lb. for the coast, leaving 4,000 lb. available load from either Norfolk or Philadelphia to Washington. Washington gets on 1,000 lb. for the coast, and Norfolk gets on 1,000 lb. In three standard space available between Washington and Norfolk. Similarly, on the other end, when cargo starts coming off at San Diego, there is short load space available up the West Coast to Oakland.

It is up to the Navy people to keep the short load space filled and build up the high load factor that makes the arrangement profitable. But with their do-it-as-shown by the normally high load factor (see table). In fact, on some short loads Slick has broken the red load, carried more than 11,000 lb. and even up with load factors of 101 percent.

Behind the Navy's ability to sustain a high load factor is a detailed reporting system whereby each station tends to obtain along the route telling reports of weight and number of pieces of it getting on each plane, list of lading number and location (by cargo hold) as the airplane. Slick loads and unloads the cargo but the Navy handles pickup and delivery.

Officials familiar with both the carrier and the Navy's ends of the arrangement are no more why government operations, a large expense, such as a freight consolidation could not work out a comparable system.

Navy started the charter service after the Korean outbreak last July to save vital time. Navy then found it not only independent, working closely with Slick representatives at each loading and unloading point.

Shipping Cost N. Y.—Phila.

(Cost of shipping one ton one way)

Mailbox delivery	1.00
Mailbox delivery	1.00
Mailbox delivery	1.00
Mailbox delivery	1.00
Mailbox delivery	1.00

*By air, 1947 to 1950.

Source: Aviation Week

the Slick contract, increasing flight frequency and dropping plane-mile price from 52 cents to 70 cents.

Navy now finds it can considerably cut direct ton-mile costs for almost all freight as well as saving time.

• Other Savings—That's not all the story. There are other money and no tangible savings, such as additional savings in specialized cargo operations as scheduled charter load time on existing lower inventory "pipelines", 25 percent less weight in packing, more reliability, lower insurance rate to loss rate. All of these save money, manpower and more.

No service other than that contract charter can ensure the shippers of these real economies.

Many points cut that despite all these advantages, hidden cost increases are low. Civil one is low loading and delivery at airport. This is no problem where local trucks are already owned and/or already have more space type. In the charter, to be processed, Navy may only one extra dock has been added to the transportation office specifically to take care of scheduling the 15 million ton miles of air cargo a year that goes by Slick charter.

In any big company, or government office, finding supply management can schedule the high load factor that makes an efficient transport pay. The shippers, with almost no discussion, status as partial or overhead involved in the operation.

NBS Missile Center To Start Operations

National Bureau of Standards is starting its new missile center in its new, two-story research center for guided missiles at Cocoa, Calif., this month and expects the center to be in full-scale operation by September. It was initially expected to cost more than \$200 million of the Washington NBS act is saving to Cocoa for management of the center.

AF Bares Secrets of MiG Engine

"The indication is, Mr. Chianassa, that they have a jet engine in the MiG-15 that is superior to any jet engine that we have today.... They have the advantages of altitude, climb and economy of altitude."—Gen. Vandenberg.

This statement tends to intensify the current MiG-baiting in Capitol Hill, and it appears to be based on accurate information supplied by U. S. Air Force intelligence.

Questioning by Antonov Weiss declares that the statement seems to emphasize the AF planes in general context.

Further, Antonov Weiss states that the Air Force chief's assertion hinges on the assumption that the Russians will be able to use more power out of the designed Bell-Kayser-Nene engine than it apparently has produced in combat in the air.

AF Kees Jett Only—Vandenberg's statement apparently does not take into consideration improvements in power output that are also expected to make inroads in upcoming U. S. jet engine versions. Nor does it consider any jet engines being used by Navy coastal aircraft in the Korean scene.

Intelligence officers in the Air Force believe from their studies of new data that the MiG engine is capable of producing about 25 percent more thrust than it has in data. They also told Antonov Weiss, "there may be an other version now."

In discussing the background of the general's testimony in the congressional

hearings, an Air Force spokesman and two intelligence officers again denied to Antonov Weiss that the Air Force has captured either a MiG or one of its engines.

Although the Air Force is guarded in its comment on the subject, it did say that the present top speeds of the MiG and the Air Force's latest plane in Korea, the F-86, whose J-47 has a thrust of more than 5,000 lb., are very close. It was indicated that the J-47 has had little success in controlling the MiG as it climbs in level flight. Over Korea, it is admitted, in the lightest weight of the MiG, altitude is the key.

■ MiG Engine Factor—Even with this consideration AF estimates the MiG engine has not been exceeding 75 percent of its designed maximum power. The reason for this is not known, but it may be the Russians have put a red line on the engine until they work out other bugs they know exist.

Despite all secrecy, the Air Force refused to quantify Vandenberg's remarks in detail. But it did promise for Antonov Weiss a statement it said was intended to prevent "conspiracy" in this country. It stressed the entire design and manufacturing ability of the Russians reflected in the latest reliable price data on the MiG engine.

The statement said, in part: "It is well known that immediately post World War II the Soviets captured German aircraft as the then relatively new field of jet engine engines."

"Certain indisputable evidence con-

cerning Soviet jet engine development indicates employment of manufacturing standards comparable to those of the United States. The available evidence further indicates the development of active Soviet design staffs to the jet engine high-temperature problem.

"Known Soviet engine, incorporating the design features mentioned above, are potentially more powerful than the engines in the aircraft which we have in operational service."

"In part, one of the most important design features in the Soviet aircraft was powerability, which was an extremely important feature in the lighter Soviet fighter class. Today's high-speed aircraft depend in a much greater extent on having a rate of climb and speed advantage."

Analysis has shown that improvement through redesign of these engine components has given the Russian engine a potential gain in thrust output of between 10 and 15 percent, to between 5,500 and 6,000 lb.

The American counterpart, not exactly the Pratt & Whitney J-47 Turbo-Wing, which was based on the Nene, has a nominal rated thrust of 5,000 lb. and a series of previous models of 5,715-lb. thrust. The Air Force has an J-47-equipped plane, however. A later development of the Pratt & Whitney engine is the J-48, currently the main in the F-86. The J-48, when an afterburner is added, will have an emergency output believed to be more than 6,000 lb.

In discussing on their latest manufacturing and design analysis for the MiG engine, Air Force spokesmen and the Russian Nene makes use of a one-infinity number of perfection map copied around the manufacturing team successfully coping with one of the major level distribution problems in that area.

American research in the same field is not used in the same manner as a simple design checklist.

Another Russian design technique being viewed with interest is a method of strengthening turbine inlet turbine rotor by means of a composite of steel and titanium. This technique is not yet used in the American design.

Generally, Antonov Weiss was told Russian engine production methods as yet to be virtually equal to ours, although USAF officers conceded that the Russians seem to be using some reform manufacturing methods we would use as well.

The Air Force representatives and they still did not know the name of the Russian jet the MiG engine.

What Vandenberg Told Senators

Gen Hoyt S. Vandenberg, Air Force Chief of Staff, testified on two consecutive days before the Senate Armed Services and Foreign Relations Committee inquiring into the Fox East military situation and the relief of Gen. Douglas MacArthur, because of the present and future importance of his testimony. Antonov Weiss, on this and following pages, presents selected excerpts, in a special editorial feature. They are arranged by courtesy of subject matter rather than chronology of exchange with committee members.

(Definition: indicates answers by voice, confirmation is indicated by "—")

Russian Jets

RUSSELL: General, we hear quite a bit about the jets that are flying from Moscow, Russia, and which sometimes have come in contact with our own jet fighters. Some of the news accounts that I have read state that these jets, which are Russian, and I believe they call them MiGs, are better than our jets, and are superior planes. I would like to have you comment on that.

VANDENBERG: The indication is, Mr. Chianassa, that they have a jet engine in the MiG-15 that is superior to any jet engine that we have today. Our training is superior and our primary control in the north is superior, which gives us an advantage, even though they have the advantage in altitude and speed, even though they have the advantage in speed.

RUSSELL: What steps are being taken to improve our jets to compare to what they are doing, or faster than these Russian jet fighters? Do you have any information on that?

VANDENBERG: We have given all the information that we have been able to obtain, on the assumption that the Russians have put into their jet engines; we are collaborating with the United States to have them making good jet engines, and through our research and development program, we are doing everything possible to produce the best jet engines that American manufacturers can make.

RUSSELL: Do we have any knowledge as to whether or not the Russians built this engine that is in these MiGs, or do we think it is an adaptation of the British jet engine?

VANDENBERG: It is a very marked improvement of the latest development jet engine that was sold to the Russians several years ago. It was made and developed in Russia, possibly with the help of German technicians, but any thought that we might have that it is an adaptation to these German technicians is wrong. The quantities in which they are now appearing on the front, both in Western Europe and in the Far East, would indicate that new production methods of very excellent aircraft are now a capability of the Russians.

RUSSELL: When you speak about the engines sold to the Russians, do you mean the Bell-Kayser jet engine? Do you mean the subject of some controversy when they were sold to Russia some time ago?

VANDENBERG: We believe it was the Nene.

RUSSELL: (Interject) According to newspaper accounts, every time our jet encounter Russian jets we shoot down from one to four and five and we report no losses. Are the newspaper accounts that are inaccurate?

VANDENBERG: Yes, they are.

RUSSELL: How do you account, then, for the fact (obvious) that our people go positively excited while they shoot down these Russian planes?

VANDENBERG: Our pilots are at the present time much more experienced in tactics and technique in flying, or in other words, they are much more trained and their command is superior. I think those are the two factors.

RUSSELL: You mean the technique—

VANDENBERG: Yes, sir.

RUSSELL: —and the 40-millimeter at whatever we equip our jets with.

VANDENBERG: Yes, sir, and the night.

RUSSELL: How far does this jet come into Korea? Have they come down below the parallel, the Russian jet?

VANDENBERG: No, sir, that is about the extreme limit of their range, and they wouldn't be able to do much fighting when they come down there under the present composition of the MiG-15.

RUSSELL: How does the range of our jets compare with the Russian jet?

VANDENBERG: That is difficult to answer in an absolute manner. Mr. Chianassa, because it depends on what type of our jets we are talking about. If we are talking about the F-86 Sabre, which is most nearly comparable to the MiG-15, I would say we had some slight advantage in range.

KNOWLAND (Interject, after consulting a Newsmag article by Gen. Carl Spinks, former AF Chief of Staff): With that background, General, I would like to ask you, from your professional military opinion, whether you believe that whenever we fly these planes, these Russian MiG fighters, are going to make a mistake against our leaders in flight in Korea?

VANDENBERG: Yes, sir, I think that any time anybody engages in combat with an enemy with more knowledge, and they are able to take the losses, those people who live are bound to learn. Of course that is a necessary statement, because we are not going to have any experience.

KNOWLAND: But not against whatever latest fighter the Soviet may have.

VANDENBERG: No, but the difficulty of shooting down a jet airplane in high speed—with obviously the same or greater speed and maneuverability, is very essential.

HIGGINSKLOPPER (Interject) General Vandenberg, getting back to the question of our differences in air quality is concerned in the performance of jet engines, which I have been curious about. Is it possible that it does not have jets that are equivalent in performance of the Russians?

VANDENBERG: Well, I can only give you a partial answer to that, and I am afraid not too definite a one, Senator. I would guess that part of the reason is that we were the major manufacturers during World War II at which to fight the war on both the Western Front and in the Far East, and that all of our time and effort, our engineering, our money, was taken up with winning the war.

While Germany was ahead of us in jet aircraft and in certain designs of rockets and other weapons, we were, I believe, able to take consideration the fact that that very money was one of the manufacturing stage that made our development. It was a new sort of jet of circumstances, but when General Gearing, Air Marshall Gearing, was first captured, I went down to interview him, and I asked him to what he had the defeat of the German Air Force. He told me at that time, in my mind, that it was because they were facing with an enemy judgment that might win the war either through concentration on a bombhead front to knock out initially England and afterwards to knock out the air force base which the U. S. Air Force operated.

He said that they were engaged at that time in develop-

Horner: Don't Belittle Soviets

Gen. Hoyt S. Vandenberg's statement that the Russian downing of the Bell-Kayser Nene engine is "superior to any jet engine we have today" drew quick comment from the U. S. Air Force headquarters with the closest knowledge of the Nene.

The day after Vandenberg testified, H. M. Horner, president of United Aircraft Corp., was asked by the Associated Press to comment. It could have been a tricky question for Horner, whose company has started its present line of engines with an American version of the Nene (J-47) and moved on to a later development, the J-48, before coming up with its own J-57.

"Certainly he must be right," Horner replied. "He has access to the facts. There is no reason why he should not be believed. In fact,

only when he is making a report of these facts to Congress.

"Why should we permit in underestimating the technical of industry of the Russians? It is highly unlikely that these articles were written to any other than World War II. And experts say that no other nation, Germany or England or even the Soviet Union, is up with a good trade in this area. A task is a pretty complicated piece of machinery, too. The Russians have long been a military superpower power."

Horner's statement was a question about engines in development and not yet in combat, Horner said he believed American jets are superior to anything the British have at a similar stage of development, but he knows nothing of what Russia has in the works.

Reef exchange between senators, during Vandenberg's appearance before the committee's subcommittee for the purpose of the Administration.

Senator Hickenlooper: General Vandenberg, I would like to permit for just a few minutes the theory of the utility of our Air Force.

Senator Fulbright: I did not understand you.

Senator Hickenlooper: The theory of the utility of our Air Force.

Senator Fulbright: Oh, I thought you said "utility."

ing jet airplanes that could go more rapidly to altitude, and were therefore building a defense force, that the rocket, if they had put half or even a third, as I would be telling me, of the effort that they had put into the development of the V-2 and V-3 into their missile program, that in the interim the war might have had a very different ending.

HICKENLOOPER: They changed models as the model of the operation and in the tactics they got caught, is that right?

VANDENBERG: They were engaged, however, in a research and development program in the middle of a war.

HICKENLOOPER: Yes.

VANDENBERG: Now we did not do that. Therefore, in winning the war we have had to pay a penalty of starting our research and development from a position farther back.

HICKENLOOPER: Except that we had the advantage of a substantial amount of their research and development when they capitulated, did we not? That is we got hold of their jets, we got hold of their rockets, their code-breaking methods, and got hold of a number of things of that kind.

VANDENBERG: Yes, so, that is true. But in an instance where we have a finished article without the burden and the thinking that developed it behind it, and all of the faults that they have overcome in that process—to get back to your point of the accident—

HICKENLOOPER: That is right.

VANDENBERG: The odd article led in front of a group of our people, we cannot possibly begin to discuss all of the difficulties and what they have had to overcome and, therefore, the know-how in order to develop a better article from that one. In effect, we are starting from the odd article just as they were starting from a sound solution of that in their mind as they built that one.

HICKENLOOPER: [After pausing, leaves an Armed Forces representative.] We have tremendous volumes in the mail now. I am concerned as to why, unless we admit defense technique and things of that kind, why we have not got at least as good a jet engine as the Germans, when we have solved, I think, for a long time that jet as propulsion of that general type is probably the coming thing. I also want to ask you whether or not we are sufficiently busy in design and experiment to save time in your opinion, either you or rocket propulsion or whatever type of propulsion of that sort may be deemed best.

VANDENBERG: Well, your question as I see it, Senator, boils down into two general areas. The first one is to what we have got, as you say, so little for what we spend so much for.

HICKENLOOPER: That is not only the Air Corps.

VANDENBERG: I realize that.

HICKENLOOPER: The Air Corps has got its share of it.

VANDENBERG: I am talking of the armed services now, if I may venture to express it in all things. The next would be the method of financing the armed services to give them a program you see, let them be the proponent for that need program, compare it at the next year and make all the money for that portion of the program that is not appro-

proved for the next year, the year following that, unless it gets and go back and subsidize a great amount of equipment of public works and so forth, and the next year call it again. And so Senator Johnson described it, a piecemeal operation. It is an piecemeal operation, and that is partly the reason.

Another reason is because the cost of living and the cost of production in the United States is higher than it is in any place, which you know much better than I do, Senator, and the price that we pay our soldiers, which is roughly 50 percent I believe of the cost of the armed services is an additional factor. Our soldiers get a much higher wage. Therefore it costs more to produce the new material and so on and so on, which you are more familiar with than I am, and I shouldn't attempt to explain that.

The second part of your question as to whether or not today we are in that position, as I said, why not have at least partly on the drawing board with the Russians, I can only venture a guess.

My guess would be that the aircraft industry of the United States had been stunted during the years—I am talking now of research and development money—during the war years and until approximately 1945-46.

Therefore the drawing board or board based models that we have of jet engines which at that time were more or less a guess in somebody's eye are now beginning to come out with some hope of getting really advanced rocket engines and weapons.

HICKENLOOPER: Now General, let me ask you whose primary responsibility lies a professional and technical standpoint as to get better engines for our airplanes.

VANDENBERG: That is an irresponsibility!

HICKENLOOPER: That is the responsibility of the Air Corps, is it not?

VANDENBERG: That is right, so.

HICKENLOOPER: That is so far as the Air Force places are concerned. I understand the Navy has a program of its own.

Across the Line

RUSSELL: Have any air forces encountered any losses coming out of Manchuria as it is culturally the lighter planes?

VANDENBERG: There have been a few reports of single aircraft operating at night that indicate that some of those might be losses.

RUSSELL: Have there been any attacks made upon our troops and installations and bases in Korea by these planes?

VANDENBERG: Korea has been dropped upon occasions. To my knowledge, they have caused no casualties as yet.

RUSSELL: Did you participate in any meetings of the Joint Chiefs of Staff when suggestions were placed upon the bombing of the Chinese installations and bases and troop concentrations north of the Yalu River in Manchuria?

VANDENBERG: Yes, so.

RUSSELL: Did you approve of any of these ideas which prohibited the Air Force in the Far East from attacking north of the Yalu?

VANDENBERG: Yes, so.

RUSSELL: Well, you are the Chief of Staff of the Air Force, General, and of course one of the standard statements of air power is a weapon of war. Why did you ever think that it should not be used north of the Yalu River?

VANDENBERG: Mr. Chairman, the application of air power is not very well understood in the country by people in general, in my opinion. While I was and am being against bombing across the Yalu, it does not mean by any stretch of the imagination that I might not be for it tomorrow, a month from now, or six months from now.

[Continued on page 67]



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The Plane: Flying Boat First

In February of this year came the dramatic announcement that the possibility of aircraft by nuclear energy had been proven feasible in theory. That simple statement penetrated the aircraft industry with a whole new world, full of possibilities and problems.

Since February, Aviation Week has been gathering the material necessary to separate you with this new source of power.

In the meeting room, the first installment showed how a lone seafaring, colliding with a nucleus of an atom of Uranium 235 causes fusion. The uranium atom is split, additional neutrons are freed to cause further fission in a chain reaction. The fusion produces heat, kinetic energy, and ionization. This energy sets heat by successive collisions with other particles.

The heat can be converted into a nuclear powerplant called a reactor by a suitable heat transfer medium and power. With shielding and control means, the power output of the reactor can be made variable in the desired quantity, in a safe manner.

But first there are design problems to be solved. With the passing of time, a small, light nuclear engine can become a reality. Then, the only need is fit a suitable aircraft. The first aviation disaster such as aircraft.

By David A. Anderson

The first nuclear energy-powered aircraft is all like blood will be a large flying boat. Its general design will be conventional, based on the philosophy that our major experimental work on a big airplane is enough. Outwardly, it will look quite like any other large flying boat of contemporary design. But the hull will conceal the difference between it and others of its class, because the nuclear powerplant will be located there.

Reactor and heat exchangers are located deep in the hull, surrounded by a wall of protective shielding. The wall is pressed in two places on its forward bow, one for the great air intake ducts which come in from the wing roots above and behind it, again for the "hot air" outlet ducts which fan out through the wings to carry the heat energy of the reactor.

Seagull turboprop engines are mounted on the wings, their disc nacelles jutting forward. Each nacelle is a counter-rotating, eight-bladed propeller. Behind each engine, a tailpipe bends the smooth contour of the wing trailing edge.

Who a Flying Boat—Present-day aircraft design problems are different from the issues now for atomic aircraft. If a designer were to start today to design a nuclear energy-powered aircraft (and that could well

be some preliminary design thinking already under way at this country in order to keep up with reactor design progress) he would find that there was one great difference between this airplane and any other he had ever worked with.

Because of the minute fuel consumption of the powerplant, there would be no material difference between the takeoff weight and the landing weight of the airplane. And that fact will affect:

- **Landing gear design.** Most landing gears are designed for a specified landing condition, for which the airplane is assumed to be lightened by the weight of some of the fuel burned. And a safety factor as design takes into account the possibility of having to land the plane in an overloaded condition.

- **Airplane structure.** The inertia load distribution will be different for a craft powered by nuclear energy. The control power system will be of weight and density re-considered to aircraft. The reactor approach to such a weight distribution would be a big bomber with a huge bomb load, but even here, the payload is not close enough to be of value in pondering design criteria.

- **Airplane aerodynamics.** In the case of the nuclear energy-powered airplane, the wing loading for landing will be the same as for takeoff and level flight. A designer today can get away with a higher than normal wing loading for takeoff condition, simply because he knows (and the customer accepts the fact) that the plane will be lighter by much of the fuel weight as the landing condition. Therefore, his landing wing loading is reduced to a more normal value. This is not the case for an airplane powered by nuclear energy.

Apart from the one major difference between above-ground and conventional aircraft, there are others of important nature.

- **Time Lag Problems.** One of these is the time response of a nuclear powerplant. This can reasonably be expected to be longer than the time response for a conventional gas turbine, although the rotating machinery could be similar. In a reactor, cooling for more power means that the control rods are withdrawn further from the pile core. This shuts less neutron, which causes more fission, which means more heat in the reactor.

In a slow reactor, this heat is not concentrated as it would be in a combustion area on a gas turbine. Instead, the heat source takes place near or less uniformly over the entire core of the reactor. The heat transferred to the medium metal would be slowly increased; there would be a further delay in transfer across the heat exchanger into the air flowing to the engines. The in-



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ing, refinements in power, aerodynamics and armament, the Vought Corsair once again roared into action against the enemy—this time over Korea. In this new assignment it performed brilliantly in close air support of Allied ground troops and in disrupting enemy supply lines.

Today—even as Chance Vought's tightly-kept team prepares for quantity production of its newest jet fighter, the "Cotton"—additional orders have been received for the latest model of the battle-proven Corsair.

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ground temperature of the air would not be felt at the engine until a short time later, because it would first have to travel through the duct, and usually, being the duct walls up to a temperature where the walls and air would be in equilibrium.

All these time lags taken together will add to a responsive figure. Therefore, the pilot cannot ask for immediate power increase—such as he would want if a landing attempt were aborted—and expect to get it.

• **Double Dosed**—The needs of this power delay is twofold, it demands: • **Very long runways**, on the order of several miles, so that takeoffs and landings become "sloppy procedures." Under such conditions, the pilot can make landings by reducing power very slowly, beginning perhaps several hundred miles away from his home base, and growing the plane on water patrol pens. Such a large runway would give him plenty of room—and therefore time—to change power if, for any reason, landing or takeoff tries had to be abandoned or postponed.

The aircraft's landing configuration would be such that a slight increase in power would suffice to get it climbing again, and such an increase could be obtained by water-side control or propeller pitch change until the motor was up to power.

• **Additional thrust**, to shorten the take-off, or to save an aborted landing attempt.

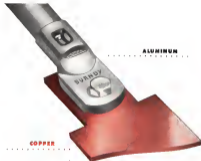
The thrust could exist only be furnished in the form of an auxiliary rocket engine located in the tail of the plane.

Crew safety is another consideration in the design of this plane. In spite of all attempts to make the engine safe with control rods which stop the fusion process, there could be a crash in which the control rods were thrown out of the chest, or in which the motor motor was burnt apart.

Actually, the reactor would not explode. The best guaranteed would be issued to the point where the reactor disintegrated. The size of pieces would be identical and the atomic reaction would be out. But the news left would be dangerously infectious. A huge area surrounding the crash would be impossible to approach, for considerable time, conceivably, it might never be approachable. And such a condition is undesirable around population centers.

Imagine such a plane being a lap during island, for example, and crash any rise a city center.

• **Fast Solution**—Taken one at a time, these design problems could probably be solved with some ingenuity. But a craft seems promising a type of airplane, or engine layout, in some dynamic scheme. And because the engine is going to be such a power-hungry job, the



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general tendency would be to avoid any other experimental ideas on the first voyage.

In fact, then, these design problems look as if they could best be concisely solved by a flying boat layout.

Such a plane could be big and roomy, with a half-power station and wing engines. During its flight test alone, it could be based in the Pacific, at Eniwetok, or perhaps at a large lagoon, like Bikini.

There would be plenty of room in the hull for crew's quarters and the new "plus flight engineer" station. In the event of an accident, the submersibility would be worked and then rapidly released so that danger to humans would be minimized.

As a first guess, the plane could be about the size of the Hughes flying boat, indeed, that craft has already been mentioned as a possible prototype for a first stage powered plane (Aviation Week Apr. 2, 1951, p. 37).

Such a design might weigh in at about 300,000 lb. Wingspan would stretch over 300 ft, and the wing thickness would be great enough to take the first neutron atomic when it is delivered.

This could be the first result of the atomic age. You might be tested along as an observer on its early test flight of the plane. And the year could be 1960.

On the Water-Vac step off the little power boat that brought you in from the first advantage of Eniwetok, and with across the waterline you tested a moving deck. Ahead of you, too, were and aft to clear on the past, is a huge flying boat. Its hull is clean and unobstructed.

The hull is deep and dark. As your eyes travel aft, you see few windows in the side. The wings are thick, straight-topped and they are of high aspect ratio.

Behind, six thick nacelles protrude forward out of the wing. Each bears a counter-rotating, eight-bladed propeller. Six whippers stick through the wing roots.

The vertical tail towers over the main group of six nacelles the giant plane. In the shadow of the horizontal tail, reversible gear has been pulled off and two mechanical land gear a rocket engine and its nozzles.

Four men are wondering around the area in sudden and sudden paths. Each holds a small box in his left hand and a short rod, used in the box by a length of cable, in his right. These are radio box machines probing for the first signs of submersibility.

As the four men grab you and thrust you to the bottom again. At the door, your identity is checked, you sign a receipt and get a sheet of micrograph paper. Inside, the crew and



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a throttle handle anywhere; all control is done by push-buttons to operate servo systems responding either to manual operation or monitoring instruments.

►Second Engineer-Sorted with his back to the first engineer in the cockpit, whose job must usually correspond to that of a conventional flight engineer. His desk is cluttered with control units for propellers, the auxiliary powerplant, flaps and the rocket engine. The panel above the desk mounts cabin environmental controls and their indicators. There are a few monitoring lights in a row at the top of the panel.

Third man of the team faces outward. His desk and controls are for one purpose only—entry. To this station from all over the ship, radiation monitors supply continuous information on the radioactivity level at any station. Flashing red warning lights go on whenever the background count or radiation level is exceeded on any detector. And these warning lights are further protected with safety devices to tell when the power supply fails, or if vibration or accident should break one of the detecting circuits.

Third engineer has a fix control system which is compartmentalized, like that at any large ship. But he also has a sophisticated radiation control system, by which he can monitor locally any dangerous radioactivity, such as would come from a pump leak.

►Nerve Center—These three engineers control the airplane as well as its powerplant. They tell the pilot when to take off, when to reduce power and at what rate. This space is the real nerve center of the entire craft.

From here, you climb a ladder to the flight deck. Also are locations for pilot, copilot and navigator. The radio operator has his shack a little apart from the rest of the flight deck. Nothing is basically different here from any other big airplane you've seen. And so the inspection of this area is merely a formality.

The word is passed around that take-off time is coming up. The group splits up, the crew going to their stations and the few observers going off to a small passenger section.

Down below in the engine room, the second engineer, after going through his checklist list, starts an auxiliary gas turbine.

►Dual Purpose—The role of this gas turbine is to burn fuel for two purposes. One of these is to melt vitreous the sodium-potassium alloy which is used as the heat transfer medium in the reactor. This alloy has a low melting point, and once molten, it pumps through the reactor and through the hot tube of the heat exchanger in one continuous cycle.

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system before starting and after shut down. It is not desirable to have the induction-potential alloy in the beam when the powerplant is shut down because it completes the initial melting process. So, when before is used to pump the fuel and another metal is shut down the engine. The metal is forced by the pressure of the helium gas into a single shaded container.

And since the molten alloy would solidify if pumped into cold pipes during starting, to add another valve before is used to protect the piping before the alloy is pumped into them.

With the gas turbine operating at rated rotational speed, the engine designer must take the helium through a small heat exchanger which is part of the starter system, and into the lines of the reactor-exchanger combination. The stainless steel valves, minimum pressure necessary for the alloy and for the pipe lines. At the time when both temperatures coincide, he perfects a balance. A solenoid-controlled switch opens the alloy system valve and lets the molten metal into the pump, which has been started by the same button. And the pump begins to circulate the molten alloy through the reactor.

■ **Heating Reactor**—The first engineer now manages the starting circuit and starts the reactor by closing the control rods to be moved slowly out of the reactor. He turns the rod position for warning power, a level production level sufficient to keep the heat transfer within limits, and in addition, to add heat to the inlet air for the next burn.

The second engine moves a valve to the helium gas turbine to form a hot bed of heated air from its compressor section, and this air is cooled through the ducts to the first engine to be started, in order to warm up the ducts and to warm the engine.

The heated air begins to wind the turbine section of the engine. Helium power is called for, and the control rods and air begin. They stop at a position which allows enough heat to run one engine at idling, to keep the entire run of metal molten and to add heat to the incoming air for the next start.

This cycle is repeated for each engine start. It is a fairly lengthy procedure, because of the product time for the heat transfer medium and the individual engine start. With all six engines idling, the plane is towed out of the shop by a small power boat. It is pulled out toward the start of its takeoff run, and then the last ones of the turbine.

■ **Take-Off Procedure**—As the giant plane heads into the wind, the pilot calls the engineer for takeoff power. The engineer acknowledges, and the pilot is told to, and, without the control rods to their full throttle power position.

turn. All engines flame upward, and the plane begins to gather speed. It accelerates, gets up on the wing, and becomes airborne for our tractor flight.

The pilot shifts the plane to a moderate altitude where full power is maintained and again as needed. When it, or even, so fast using by climbing to high altitudes to reduce the drag and sharpen the thrust. The big plane is maintained for level flight at about 100 mph true air speed, and the maneuver of a 10-hour flight before.

Day becomes night, and then day again. After one week's run at a four-hour cycle, sleep in the hotel, the kind of a Gage-Miller counter simple rotation and seal continuous signals to the master control panel in the reactor bay.

■ **Landings** by the helicopter. The last day, and the plane starts to home base. The pilot begins his landing toward the water landing strip several hundred miles away. The engine slowly returns the power level of the reactor. Some means monitor the rate of change of temperature through of the hot air through the ducts, comparing it with a signal from the rate of power decay in the reactor. Positioning motion change the jet pressure depth continuously so that the power production move and falls slightly as the system limits above and below the exact power level.

Gradually the stall comes into sight, and the plane is just descending the water. Then the first wave crest slips the bottom and the plane settles onto the Pacific in a splash of spray.

As it does to maintain water-lifting speeds, the boatman comes alongside. One of the plane's outslings over a line which is made fast, and the boatman starts off toward the anchorage.

■ **Shutdown Steps**—Inside, the engine completely shut reactor shut down. The reactor control rods have been drawn home, and now the molten metal is blown out of the lines with warm helium. The helium goes down, and the prop-belt lands into image of airplane blades.

The flight is over, 50 hours, once around the world, no refueling in flight, no stops at advanced bases.

Fuel burned. One pound, more or less, of infrared energy.

And a flight such as this would be only the beginning. It is time to come, there will be land planes as well, with fuel tanks buried in their wings. Their flight times will be limited only by the level of continuous operation that can be provided for the crew and the relief and their relief crew.

Eventually, the nuclear engine will be at the stage of development where commercial air transport using it will be competitive with gas turbine-operated

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A Marmar V-Land Composite attaches the bell end to the helicopter gearbox of the high performance U.S. Air Force's Bell-Boeing V-100. The Coupling is highly efficient and easily maintained, and the Coupling serves also in clutch conversion to structure by means of two sets of vanes, eliminating the necessity of shafts.

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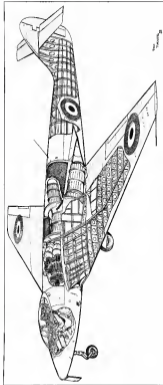
ENGINEERS' NOTEBOOK

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Aviation Week Design Study: Hawker P.1052

The P.1052, second jet aircraft designed at Hawker Aircraft, Ltd., is devoted to the Aviation Week design.

Originally conceived in 1945 as a development of the P.1040 (which became the Sea Hawk, a straight-winged fighter now in production for the Royal Naval Air Force), this jet design proposal for the 1052 was submitted in the spring of 1946. In May, 1947, Hawker received contracts to build two prototypes for the P.1052.

The wing of the 1052 is swept back at an angle of 35 deg. at the quarter-chord line in a choice of sweep angle which offered a compromise between drag reduction at high speed and handling characteristics at low speed. The low wing aspect ratio was chosen from a study of optimum values for various sweep angles.

The intake wing, which is integral with the fuselage, was retained somewhat in spite of a desire to increase the area of the swept portion of the wing as much

as possible. This meant that the wing root thickness had to be increased to maintain the same engine air inlet area.

Main wing sections are 30 percent thick, and are symmetrical. Maximum thickness is at the 30 percent chord station.

Horizontal tail is basically that of the Sea Hawk, except that the spar has been modified by replacing rounded tips with squared ones. Tail thickness is only 9 percent of chord at the root. The tail is not considered necessary at the time to accept the surface.

A point of structural interest is the unique Hawker-patterned split engine, which first appeared on the Sea Hawk prototype and has since disappeared in the Thruster. All-engine P.1051.

The P.1052 is powered by a Rolls-Royce Nene 2 turbojet rated at about 3,000 lb thrust. Wingspan is 31 ft 6 in., length, 37 ft. 85 in.; wing area, 250 sq ft., and the aspect ratio is 4.19:1.

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The MD-43 Dynafocal has an exceptionally low natural frequency which allows it to isolate as much as 90% of engine vibration. The new type damping element has greater and consistent... to ensure an clean and quiet... and is continuously renewed. There are other improvements—increased service life and improved performance.

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Canada's First Certificated Copter

Latest of the rotary wingers to be certificated in the North American continent is the Army Air Corps' SG VI, which was given its ticket on Apr. 2.

It is the first copter built and certificated in Canada. Work on this rotary-wing aircraft was suspended back in 1945 and resumed again in the fall of '49. It is a 1-place, fully articulated, 4-bladed single rotor configuration, powered by a 175 hp Franklin engine. All engineering work, from original sketches to the certification reports, was performed solely by Dennis W. Snyder and his assistant, Schma Gertich.

Total development cost of the project is reported to be under \$100,000. Production of the copter is scheduled with a 200 hp engine.

In granting the certificate of airworthiness, Canada's Department of Transport followed U.S. FAR Part 60.

Tests—to demonstrate power-off landing without runway—still are the part of the plot. The SG VI had to perform six consecutive take-off landings from altitudes of 600-800 ft., with power cut at 50-55 rpm, and rated upwards, also three sets three power-off landings from 1-15 ft. altitudes.

To check the mechanical integrity of the craft, the copter flew five consecutive days regardless of weather, when average temperature was 35 below, with a maximum of 36 below zero.

Data—Gross weight of the copter is 2,400 lb., empty, 1,735 lb. Max rotor diameter is 36 ft., solidity 0.61, speed 170 rpm. Disk loading is 2.64 lb./sq. ft., power loading, 13.45 lb./hp. Range is 200 mi. Best rate of climb of the craft is 700 fpm.

Length is 49 ft. 58 in., wheel track, 9 ft., wheel base, 11 ft. 18 in.

NACA Reports

Correspondence Flow for Wings in Laminar Potential Fields of Subsonic and Supersonic Speeds (TN-2149)—by Selmer M. Hwang.

In wing theory, the most important problems are to find solutions for the disturbance parameter in a flow field, given the angle of attack to the leading edge of the wing. These conditions involve specifying either conditions in vertical velocity distributions on the wing.

These problems can be solved by any correspondence flow methods, where the flow field due to arbitrary velocity distributions is determined in terms of the flow field due to uniform distributions.

Correspondence flow adds to the relation between the disturbance parameter of two flow fields.

The analysis is made specifically for

wings with symmetrical profiles at zero lift, and for arbitrary thicknesses, plus leading lifting conditions. Superposition principles can be used to apply the results of the analysis to wings having arbitrary profiles.

A generalized theorem and corollary developed in the TN apply to wings in laminar potential flow at sub and supersonic speeds and states:

If air velocity distribution derivative is related by a constant to another, or to a different velocity distribution, the relation is valid through the entire flow field for any corresponding disturbance parameters. Appropriate edge corrections have to be made.

If the flow on the wing is related through deformation to a standard direction, edge corrections may only be needed for leading and trailing edges, if the flow is related to its generic direction, only side edge corrections may be needed.

—DAA



FLIGHTMETAL *Imagineering* tells what "tuckers" a structure

One sure way to discover how much an aluminum alloy structure can take is to deliberately destroy it in the laboratory, and record what happens.

Two spot-welded aluminum alloy beams are mounted in this long-running machine, designed and built by Alcoa Research engineers. An instrument measures the load, the machine heats the specimens back and forth. By the time a beam finally goes "bored out" and fails, another valuable record is available to help predict Alcoa Aluminum's performance in service.

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Other Divisions: Fairchild Aircraft Division, Hawthorne, Calif.
Fairchild Engine Division, Allis Division and Bendis Division, Los Angeles, N.Y.

PRODUCTION



PROXIMITY is an asset in seeking subcontractors. Most of 36 info centers around Ft. Worth.

How to Get Subcontracts—III

Let the prime manufacturer know what you have and what you can make; if you're men him it will help.

By William Kroger

Two of the best assets a firm looking for subcontracts can have are a detailed list of its facilities, resources and capabilities, and the fact to be located near a company which needs subcontractors. It is difficult in Aviation Week's survey of prime manufacturers' subcontracting needs and practices.

Proximity is important for a number of reasons. Particularly, it permits close technical collaboration, which often is the one factor dominating most to a successful relationship between the prime and subcontractor.

Importance of a complete listing of facilities is emphasized by most companies responding to the survey. A prime manufacturer cannot afford to place heavy contracts with a firm that has not been thoroughly investigated. The fact is the first step, it opens the way to further contact on the prime's part.

Previous reports in this series on subcontracting have outlined in general the best sources (Aviation Week May 26, p. 15), and have given a company the company listing of details on some of the firms most active in subcontracting. Following is the situation at other companies responding to the survey.

BENDIS

•Current Status—Bendis Aircraft Corp. has 14 divisions in various parts

of the country, and each division does its own subcontracting. It suggests that potential subcontractors make the usual contact by mail, stating types of facilities, what kind of work they feel they can do best, and attach a general list of the machinery, equipment and jigs and available for the job.

CHASE

- Current Status—Not actively seeking subcontractors now, but will be in about three months.
- Future—Chase has had only a very small contract for aircraft transports, on which it has subcontracted 15 percent of finished work. Now, the company's C-124 has been ordered put in production at the Kaiser-Aluminum plant in Willow Run, Mich. It is expected that Chase needs this will be heavy. While production is months away, the company already should begin screening subcontractor capabilities soon.
- Present Address—Chase Aircraft Co., West Tisbury, N.Y.

CONVAIR

- Current Status—Actively seeking subcontractors now, but only a small number and generally by R-35 work being handled by the Ft. Worth plant.
- Subcontract Items—Machine shop work, powerplant packages, engine doors, wing sections including flaps and trailing edge assemblies, elevators.

•Future—Extent of future subcontracting depends on military procurement activities.

Company says that its postwar sub contracting has been so slight that sub contracting activities have been combined with procurement of parts and materials. Even so, it expects this year to pay out \$120,000,000 to subcontractors. In subcontracting amounts to about 35 percent of the value of its production, compared to about 12 percent in 1949.

Potential subcontractors close to Ft. Worth have the best chance. Of 46 subcontractors on the R-35 program, 15 are Texas firms, five are Ft. Worth.

•Address—Consolidated Vought Aircraft Corp., San Diego 32, Calif., or Grant's Lane, Ft. Worth.

DOUGLAS

- Current Status—Adding 1,000 subcontractors and expects this year.
- Subcontract Items—Cannots, forgings.
- Future—Douglas anticipates heavy sub contracting and supplies. This year, 45-50 percent of income will go to sub and suppliers, compared to 14-17 percent last year.

Douglas has issued a memorandum giving complete details on subcontracting procedures. Here upon, the importance of a detailed listing is emphasized. In addition to the normal details of size, tools, equipment, etc., Douglas wants photographs of your plant under sitting, addresses, addresses of your principal suppliers, and information on your inspection equipment, in addition to other data. Douglas also stresses the importance of trying to get subcontractors from plants in your locality. For the memorandum, write D J Bone.

•Address—Douglas Aircraft Co., Santa Monica, Calif.

FAIRCHILD

- Current Status—Not actively seeking subcontractors now, but probably will be in six months.
- Subcontract Items—Aluminum, doors, fuselage, engine work.
- Future—Fairchild subcontracting is 17 percent of finished work by release and retire, and these ratios will increase within the next year. At the present rate, the estimated annual payments to subcontractors is \$5 million.
- Address—Fairchild Aircraft Division, Fairchild Engine & Aircraft Corp., Hawthorne, Md.

GENERAL ELECTRIC

- Current Status—Seeking only a small number of subcontractors for special-order items.
- Subcontract Items—All parts and sub

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- **Current Status**—Not actively seeking subscriptions now.

► **Cessna Aircraft Co.**, Wichita, issued Cessna 190 output June 1 to permit deliveries of about 33 planes more 1980 during the latter part of 1982.



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Our Expanding Industry . . .

General Electric Co. plans installation of a \$14-million plant to build jet engine components at Louisville, Ky. Covering 700 acres, the new facility will include five large factory buildings, a warehouse, laboratory and administration structures. The company has also taken an option to lease a plant formerly occupied by Gaymet Mfg. in Loudon, Vt., containing 60,000 sq. ft. of manufacturing space. The site would be used for jet engine parts manufacturing, including oil sealing. . .

Gleason Engineering & Manufacturing Co. has awarded West Engineering & Manufacturing Co. a contract to build engine assemblies for the F3M-1 Macho patrol flying boat. There is an option on sub-contracting the Boeing B-47 and Lockheed P7V.

Ryan Aeronautical Co. has started construction of a 75,000-sq. ft. addition to its manufacturing facilities to expand jet engine component output. More than 52-million worth of new production machinery and other equipment, exclusive of special tooling and fixtures, are to be installed in the new \$908,000 structure.

Collins Radio Co. has initiated plans for a new \$1-million manufacturing and assembly plant in Trent, to occupy 60,000 sq. ft. and employ 1,600. Completion is expected in six months. Collins has already started installation of nearly 52-million worth of new equipment at its Cedar Rapids, Iowa facility.

Continental Motors Corp. is making construction of an addition to its Detroit manufacturing plant on Armstrong Ave., increasing the division's floor space by about 23 percent. Continental is making single-cylinder, two-cylinder engines of 3 to 24 hp.

Westinghouse Electric Corp. plans to build a huge new plant having 1.9 million sq. ft. of floor space for jet engine components construction on a 150-acre site in Franklin County, near Columbus, Ohio. The new factory will lead other Westinghouse jet plants and will employ at peak up to 7,600. It is being designed to handle customer applications after defense needs are met.

What's doing at JACK & HEINTZ

Alternators Offer Means to Boost AC Power Output

The large amounts of AC power required by modern aircraft have led to the use of engine-mounted alternators which are high in efficiency, thereby permitting a given airplane to have available the maximum amount of AC power with the least tax on engine output. Also, commutation and brush problems inherent in DC generation at high speeds are largely avoided, there the brushes and commutators used in the alternators may be utilized on much lower current densities than would be practical on DC machines. By using alternators to generate AC power, the total installed electrical system weight may be reduced appreciably.

In addition to engine-mounted alternators, J&H has developed machines for use with air turbine drives, hydraulic drives, or other power sources. The current J&H line of aircraft alternators ranges from 3 & 1/2 to 312 KVA, with both constant and variable-speed machines in most ratings. We also offer tailored designs for guided missile applications in-



A representative J&H Alternator—the GNE-6 Model—with a 15 KVA, 120 volt, single-phase rating.

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In this complete model building shop in the engineering laboratory, J&H takes designs off the boards and makes them work. Finished parts are fabricated and checked carefully against specifications. They are then precision assembled into electrical, hydraulic or mechanical products for thorough experimental testing. Individual customer need and flexibility make J&H engineers to get at your problem faster . . . just say the working Rotomator prototype you require.

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Commercial Air Lines—Pan Am	18
Aircraft Manufacturers	12
Aircraft Engine Manufacturers	8
Aviation Equipment Manufacturers	6
Research & Development Centers	2

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across electrical, hydraulic or mechanical divisions designed to solve unusual problems of developing power, controlling it, or using it.

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Many customers have asked us for quotations on special types of alternators—constant, induction, and the like. Our company has built several models of these, gaining experience that is invaluable in determining the best type of alternator for a specific program.

In general, there are no "right" machines that solve all of the familiar problems we encounter. Each type of machine has its advantages and its disadvantages. Often, we are asked to create a specific type of machine, but after learning more about the application, we find that another type is better suited.

Usually these situations arise from a misunderstanding of the loads problem involved in high altitude. Many airplanes have been made in the (misguided) and application of brushes, especially as applied to alternators. It is a rare occasion where we find it accurate to provide a "brushless" alternator design with its inherent disadvantages.

We hope our customers will provide us with a maximum of application and environmental data. We will then be in a position to choose the best type and design of machine to meet your requirements. Write JACK & HEINTZ, Inc., Cleveland 13, Ohio.

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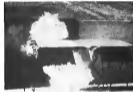
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EQUIPMENT



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. . . but a hit on this protected tank produces only a puff of smoke.

Device Suppresses Fuel Tank Explosions

Time lag between ignition and critical pressure point gives an inhibitor a chance to prevent blast.

Latest advance in keeping military planes' fuel tanks from exploding when shot up is to suppress the explosion so quickly that it does not have time to damage the aircraft structure. This is the theory behind the new General Electric Suppressor System.

Experimenters by General Electric and MacLennan of the Royal Aircraft Establishment indicated "that a time lag exists between the ignition of an inflammable fuel vapor and its explosion and the development of the maximum explosive force of pressure, whether the

vapor be an 'ideal' gasoline vapor and an mixture of maximum explosive volume or a less-than-ideal mixture of less explosive volume."

The Atlantic-Pacific Aircraft Co. aircraft fuel tank will withstand an internal pressure of from 5 to 7 psi with out rupture; the problem was to devise a mechanism that would detect the pressure rise in its initial stage and release an inhibitor which would suppress the building explosion before it reached destructive proportions.

Actual experiments indicated that

with ignition taking place at one time and pressure, pressure was started slowly: 5 psi in 5 milliseconds, 1.5 psi in 10 milliseconds then suddenly 5 psi in 15 milliseconds and 50 psi in 35 milliseconds.

The problem took on concrete form. It's mechanism could be developed that would detect and suppress an explosion in 10 milliseconds, tank structure would survive intact.

General suppression experiments used a pressure-sensing device in the bottom of a light tank and a suppression fluid containing wax mounted on the top cover plate. They failed because the speed of flame propagation from the source of ignition towards the bottom

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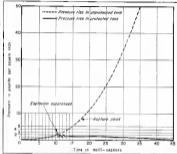
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of the tank was faster than the travel of the suppressant fluid from the outermost unit.

Improvement in the suppressant atom resulted in a unit that would provide complete suppression in a 45-gal tank.

The Suppressor System-A. recent demonstration of the suppressant system was shown by Soudan's Associates, Inc., Anaheim, California, for the Government suppressant system. The system consists of two parts:

1. **Pressure rise detector.** Two bellows, about 1 in. in diameter are mounted in a housing face to face. Flooded in the vacuum of a fuel tank, a pressure rise would immediately be sensed by the bellows, pressing them in contact with the other and closing an electrical circuit.

2. **Suppressant venting unit.** This component is a fragile plastic cup containing the suppressant (may be either ammoniacal, methyl formate, or water) with a fast exploding detonator to initiate the release as rapidly as possible.

The demonstration unit was pressurized (two planes in 40) (pressure 30 in. mercury) gas bubbles were fed into identical tank structures of varying capacity and construction. The tap record showed a lot of liquid out of vents but assumed drastically so. Non-vented tanks exploded violently in every instance.

Pressure changes in a tank striding from the most violent conditions do not activate the pressure rise sensor device, according to the manufacturer. Pressure surge resulting from a comb

as he counted on to trigger the vent, it added.

Although designed to give one shot protection, the suppressant system is not absorbed in its liquid fuel for some time thus providing long periods of protection.

Engine operation should not be interrupted in any appreciable degree because fuel is truly flights contaminated by the inhibitor.

The maker says that 10 cc. of suppressant agent per gallon of space is needed to give 100 percent effective inhibition of solid explosion reactions or (in fact) vapors. It suggested that since this condition affects costs in actual combat, 75-percent-effective protected protection could be provided with half as much agent, thus reducing the number of containers required.

To take care of inverted flight, two pressure detectors may be provided, one at the top of the tank, the other in the bottom.

Soudan's indicates that inhibition tests in the center are underway.

Tires Keep in Step With Jet Planes

The aircraft tire industry is keeping pace with the rapid advances of jet plane development, according to T. F. Goshorn, vice president of T. F. Goshorn Co.

Significant strides are being achieved. High resistance to destructive internal heat buildup at the increasing thrust and landing speeds of today's jets. Goshorn said the project has reached



Trans-Atlantic Teamwork

The two-jet Cuckers, being ground to deliver our tactical air power, is a working example of British-American cooperation. Originally designed in England as a high-altitude radar bomber, the light test proved to be as effective as low-level operations. Now, a light intruder version of the light jet bomber will be added to our own Air Force, built by Martin under license from English Electric Co., Ltd.

The Korean conflict has re-emphasized the importance of tactical air power in low-level support of ground troops. To this mission, the Cuckers brings exceptional maneuverability at high combat speeds, and in low limits and low speeds... ability to whip around like a fighter and then with the best of modern aircraft... ability to carry a point, destructive wallop!

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This courtesy of The American Airlines

On McDonnell's twin-jet Banshee fighter-

Safety Glass

BY PITTSBURGH

Built by McDonnell Aircraft Corporation, St. Louis, Mo., the 1962 Banshee is one of the Navy's first low cost defense fighters. A wind-shield of pressure ground, bubble-molded Pittsburgh Multiple Safety Glass gives the pilot maximum vision under all conditions.



The Navy is relying on the career-board, twin-jet McDonnell Banshee fighter as one of its most powerful weapons against all types of high-altitude bombers. For maximum vision under all lighting conditions, the 600-mph-plus fighter is equipped with a wind-shield of Pittsburgh Multiple Safety Glass.

The wind-shield is pressure-ground, bubble-molded flat glass of gas-tight sealable type. It is designed for maximum possible light transmission under all conditions—dark at dawn, daylight or even night fighting.

The Banshee is only one of today's modern aircraft—military and commercial—that depends

on Pittsburgh for observation and sighting panels. Designers know they can count on the research facilities, manufacturing equipment and practical know-how at Pittsburgh for assistance in solving their toughest problems.

When you have problems involving Safety Glass and glazing methods for airplanes, bring them to us. Pittsburgh Plate Glass Company, Room 2775-L, Glass Building, Pittsburgh 29, Pa.



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220 mph. takeoff speed. Specialty composite wheels drive the truck.

• Goodbye weakened strength. Achieved through new design and construction methods is resulting in tires capable of supporting 68,000 lb. per tire. World Wide 11 tons (on the B-27) supported 15,000 lb. each.

• Extra high pressure tires with small cross section and large diameter, can be rolled into the rear fuselage needed to skirt through the wire hangar. Goshawk indicated that a recently developed five lobe surface provides up to 180 psi.

• "Cold weather" tires are now being made that will withstand temperatures down to -45 deg. F and remain flexible enough not to develop flat spots when supporting the weight of a plane. Goshawk pointed out that at that temperature rubber compounds known as the early 1940s would break and shatter like glass in impact tests.

Small Unit Banishes KLM Cabin Hot Air

(McGraw-Hill World News)

Amsterdam—KLM Royal Dutch Air Lines and instrument shop at Schiphol Airport, has designed a portable cabin air conditioning capable of lowering interior air temperatures of its planes by 5 deg. below ambient. Red fire hazard is cut 15 to 20 percent.

Of simple design and operation, the units will be shipped along KLM's tropical routes to provide its passengers with "cool air on tap." First conditioner has been completed, others are being built.



PLASTIC LENSES

Polystyrene plastic lenses and on today's aircraft have many advantages according to the manufacturers. Just Corporation, Acanda, Calif. Besides being highly resistant to abrasion, radiant energy and solvents, the lenses can be designed to a number of shapes after receipt of order. The supplier adds that the cost is about 1/3 that of ground glass and the lenses weigh considerably less. Light transmission is 90 per cent.



Helicoil Inserts Prevent Thread Wear in all Tapped Holes

Helicoil screw thread inserts of stainless steel or phosphor bronze wire are widely used on airframes, engines and accessories . . . wherever cap screws, bolts, or studs are used. These precision-formed inserts outlast the product, and permanently protect the threads against stripping, galling, corrosion, seizure, electrolysis, vibration or other causes of thread failure. In one famous jet engine alone, 588 Helicoil inserts are used.

Helicoil Inserts invite better design and weight-saving by permitting smaller bases and flanges, fewer bolts, shorter thread engagements, more blind holes. They conserve material, expedite and perfect production savings. One manufacturer salvaged \$300,000 worth of castings in a year with Helicoil Inserts! Ideal where frequent assembly and disassembly causes thread wear.

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NEW AVIATION PRODUCTS



New Cockpit Controls

A compact, remotely operated by diesel control, designed to substitute hand and taking the mechanical linkage in jacket control pedestal, has been developed by Suncoastwide Corp.

The system consists essentially of a master unit and slave unit sections actuated by two small tubes. Motion applied to the scanning laser of the master unit is accurately duplicated by the laser on the slave unit—making it "ideal for manipulation of shuttles and other controls" on the water.

The system is lightweight (less than 100 lb) and self-contained. It doesn't have to be hooked up to an external source of hydraulic power. It has positive, two-dimensional load-carrying capacity—handling up to 300 lb. Its scope—and can be provided with or without an automatic lock to prevent runaway if the flow leaks.

The control was developed with an eye to overcoming disadvantages of blackbars that may exist with present equipment, to provide another option and greater rigidity under load.

To effect effects of insensitization, the system is used to provide for expansion and contraction of both fluid and solids in a manner that minimizes acceleration between master and slave units. Superflextronics says that in most industries savings in engineering and installation means a lower cost per unit of the unit, with costs lower than other ways of the unit.

The equipment also has wide industrial applications, according to the firm. Other sizes and capacities soon will be available, it reports. Address is 14256 Wyoming Ave., Detroit 4.

Cabin Heat Control

A compact electronic regulator for controlling outlet temperatures in jet and piston pumps has been developed by Vapor Heating Corp.

The next day these Goups maintain temperature at a degree selected by the pilot, it heats for utility purposes the maximum temperature of the cabin supply, and finally, by means of a sensing thermostat, it prevents windshield defroster air from getting too hot and damaging windows.

The unit is believed to be one of the simplest regulators of its capacity and type yet developed. It is responsive to temperature changes of ± 0.01 deg F and a built-in recorder is applicable to many specifications, the firm says.

In operation, alcohol signals from temperature sensing elements are fed to the regulator, then amplified and fed to a control discrimination circuit. This circuit adjusts the proper relay, which in turn operates a bypass valve actuator which causes an oil damper to move in the proper direction to change the temperature in the oil as dictated by the pilot. Temperature may be adjusted anywhere from 40 to 150 °F.

The unit weighs about 45 lb. with shock mount, 16 lb. without. Dimensions 68 x 31 x 6 in. Address: 30 E. Jackson Blvd., Chicago 4, Ill.



Compact Omnihome

One of the latest VHF transmitters from competitive radio packages for private planes to reach the equipment counter is the Dynaflovec VHT-1 produced by National Aeronautics Corp., Ambler, Pa.

All functions of the Overhimer are passed into a single unit weighing 44 lb. It takes up a space of 54 x 54 in. on the face of the instrument panel and a depth of 18 in.

The receiver section, providing both VHF communication reception and emergency navigation needs, operates through the 105 to 127mc band. The transmitter operates on four crystal-controlled channels on the VHF band from 121.5 to 132.9mc. But is stand-aid equipment it is supplied with two

crystals only (122.1 and 122.5 for calling remote stations and towers), while two extra crystals for any other frequency within the transmitting band can be added if specified by the purchaser.

For precise tuning of the receiver, a ground-plane crank is provided, requiring 18 turns to cover the 125 to 127mc broadcast range.

Velocity is controlled by the on-off power switch. Selection of transmission frequencies is controlled by a frequency switch. For on-aircraft navigation, a control thumb wheel permits selection of any course from zero to 360 deg. Also, a "to/from" switch temporarily converts the zero left-hand indicator to a "to/from" indicator when the pilot wants to check direction of drift.

An indicator light on the face of the unit monitors output and modulation of the transmitter. Transmitter modulation is said to be over 90 percent. A sidetone is provided in headset. The receiver is designed with a sensitivity of one microvolt and selectivity of 50 Hz noise width with 60 dB rejection.

tion on average 200 Le. channel. Audio output is three watts in the loudspeaker; ie 1.5 watts into low-impedance head sets. Nuno says the set features improved temperature compensation for tuning stability.

ALSO ON THE MARKET

Tool sharpening attachment, for use with Tycro's lathe and grinding wheel stand, is designed to provide faster, more accurate sharpening of end mills, conical rollers, spot faces, reamers and similar tools, including carbide tipped parts. Made by Tycro Products, 264 Marlboro Ave., Buffalo 23, N.Y.

Pliers for electrical work are said to be ideal for use with relays, distribution, instrument panels, lights and other devices. Versatile tool has two side cutters, cranks, slapper and two special jaws (one round, one square). By loading were made by Fiberglass Tools, Fremont, Ohio.

Large volumes of compressed air for pneumatic systems can be cleaned in one line of industrial mass-air separators. Air is processed through ceramic filter. Liquids and dirt are ejected automatically. Made by Solair Corp. of America, Philadelphia.

Vertical drilling attachment quickly converts stacked horizontal Nichols rollers for precise, diversified vertical drilling operations. Available from W. H. Nichols Co., Watrous, Miss.

—in action—
for all progress



Here's news on the real problem of squeezing the new, leafy sheep-*gr* wings: a brand new hatch that packs more than 100 less space than was before—by using "squared air." Because square laminations crowded conventional hatchery out of the picture, Sothen-Combs'Condoms engineers had to "lose their own legs" to achieve the necessary capacity and resistance.

A small percentage of high pressure air is lost from the gas compressor, lost over a post-test heater line or temperature being up to as high as 450° F! The superheated air is then pulled in small tubing to the dissolution system. This job is only one of many future developments that build great promise for records of the future. If your heating problems call for temperature, strength and a wealth of hard-core materials, you'll do well to get in touch with your nearest industrial revolution.

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FINANCIAL

MCA Goes to Public for Expansion

Enlarged invested capital base means greater excess profits tax credits; debt cost is tax-deductible.

In the first public debt financing of an air carrier since June, 1946, Mid-Continent Airlines, Inc. has marketed a \$1,000,000 issue of 12-year 4 percent convertible debentures.

This financing, together with other loans, is designed to help Mid-Continent complete a \$4,750,000 expansion program. These expenditures are:

- Acquisition of six 44-passenger C-54 aircraft at an aggregate cost of approximately \$1,125,000.
- Acquisition of its spare F4W B-1500 Model CB-16 engine, spare Hamilton Standard propellers, and other equipment by the use of the tax-free Clausewitz security, at an estimated aggregate cost of \$125,000.

- Acquisition of other equipment, tools, accessories and parts for use in connection with the C-54 aircraft, at an estimated aggregate cost of \$449,000.

- Modification of 19 presently owned Douglas DC-3 aircraft to provide in each, three additional passenger seats, integral step passenger loading door and larger main cargo compartment and door, at an aggregate cost estimated at \$252,800.

- Construction of a new hangar and service facility unit at the Minneapolis-St. Paul Metropolitan Airport, at an estimated cost of \$480,000.

- Other Funds—In addition to the funds obtained from the sale of the debentures, Mid-Continent plans to obtain additional capital, not to exceed \$1,000,000, through secured bank loans.

Further funds, to finance the construction of the hangar and service facility unit, are being obtained through a \$125,000 unsecured loan from the Phillips Petroleum Co. This loan is made for ten years and carries a 4 percent interest rate.

At Feb. 20, 1951, Mid-Continent was indebted, under floating mortgage notes to The First National Bank of Kansas City, to the extent of \$1,197,139.

The interest rate on some separate promissory notes covering this debt ranged from 2½ percent to 5 percent annually. Prior to Jan. 1, 1951, the notes (except to some the variable agreement with the same bank for additional loans not to exceed \$7,000,

000, at an interest rate of 4 percent) this loan will be secured by the new secured and related equipment being acquired.

Phillips Petroleum Co. loans have appeared in previous airline financing. In April, 1947, the oil company loaned \$250,000 at 3 percent interest on a five-year loan to Continental Air Lines, Inc. This same loan was extended to July 31, 1954 on Apr. 30, 1948 at a 4 percent interest rate when it was subordinated to some bank financing accomplished by the airline at that time.

• **Common Convertibles**—The Mid-Continent debentures will have an initial conversion rate of 50 shares of common stock for each \$1,000 principal amount of debentures. This is designed to make the issue more attractive for purchasing as it holds out the prospect of capital appreciation (through any rise in the price of the common stock) while according to interest income returns in a relatively secure security.

The success of this financing was greatly aided by the conversion terms. The stock is currently quoted around \$5.50 per share. On the basis of a value of better than \$5.50, this \$1,000,000 is equivalent to over 180,000 shares of common stock. A price of \$11.50 per common share, for example, can immediately establish a maximum quotation of \$1,015 for each \$1,000 debenture. On the other hand, any decline in the price of the common stock should find immediate reflection in a sympathetic price movement of the debentures. In this respect they will be no better than convertible preferred stock.

While Mid-Continent is exchanging debentures for this financing, its preference to obtaining senior equity in preference to common funds convertible debentures. In the first place, interest on debt is tax-deductible, dividends on preferred stock are not. Further, a large amount of capital here is being contributed which will prove beneficial to the carrier for excess profits tax credits.

• **Equity Dilution**—Convertible dilution of the existing equity will occur upon ultimate conversion of the debentures into stock. As of Feb. 28, 1951, Mid-Continent had 447,114 shares of

common stock outstanding. Assuming full conversion of the \$1,000,000 debentures within the next five years, a total of 180,000 shares of additional common stock will be created, or a dilution of some 40 percent of the present common shares.

Mid-Continent also has an authorized issue of 200,000 shares of preferred stock but notes the management contemplates selling up at the present time.

The company's registration statement discloses that, as of Feb. 18, 1951, Thomas F. Ryan III, Chairman of the Board of Directors, owned 50,000 shares, or about 10 percent of the total issue. All officers and directors as a group, including Mr. Ryan, accounted for a total of 154,948 shares, or approximately 35 percent of the outstanding shares.

• **AA Dual Sidebars**—It is interesting to note that in 1945 a consolidation of Mid-Continent and American was proposed by the management interests of both airlines. The idea of exchange was to be four shares of Mid-Continent for one of American. The Civil Aeronautics Board (CAB) has just ruled down in 1949. Had this consolidation been consummated, each share of Mid-Continent stock would today have an equivalent market value of only about \$4.00 instead of the actual quotation of better than \$5.50.

Mid-Continent has paid cash dividends totaling \$1.50 per share since 1948 up to the present time, compared to a single 25 cents per share dividend paid by American (in equivalent to 5 1/2 cents per Mid-Continent share) under the proposed exchange of stock.

In the meantime, Mid-Continent has extended its route mileage in the Midwest. From an original 830-mile route operation in July, 1936, Mid-Continent has expanded to its present 1,592-mile route network serving 35 cities in 12 mid-continental states.

Up until June, 1950, the company's operations were confined to DC-3s exclusively. At that time, it acquired four C-54s from Pan American World Airways. One of these C-54s was destroyed in a recent accident. The company now owns 25 DC-3s in addition to the remaining three C-54s.

The recent Mid-Continent financing is significant in that it represents the first airline security offering in almost seven years of top-level dispute the vast capital expansion being experienced in the industry. For the most part, promptly placed along with banks and insurance companies have provided the primary additional funds sought by the carrier.

—Felix Altschul



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AIR TRANSPORT

Pilot Compensation By American

	Costs Per Dollar of Operating Revenue	Costs Per Revenue Passenger Mile	Costs Per Revenue Ton Mile
1939	33.1	3075	6070
1941	9.8	3043	5561
1945	3.7	3111	4681
1946	1.5	3440	5297
1949	0.4	3043	5940
1950	0.1	3070	5512

Source: Presidential Emergency Board.

A New Pattern for Flight Pay?

AA pilots and co-pilots win advances in emergency board's decision which may set pace for the industry.

By F. Lee Mason

The Presidential Emergency Board decision on the American Airlines pilot dispute sets a new or industry wage pattern. Some increase in co-pilot pay in the near future, with the American Airlines pay scale expected to pace the rest of the industry.

Highlights of the decision:

- **Copilot pay formula** recommended by the board is like that for first pilots. It gives a sliding-scale increase with hours flown and weight and speed of type flown. Co-pilots in fact have been paid by so many important airline agencies in perhaps the finest tribute that could be paid to this new and revolutionary ignition system. Before Bendix low tension system was offered to the industry it was subjected to the most exhaustive tests under all operating conditions. The results in terms of efficiency, economy and all around dependability were so pronounced that we felt justified in announcing our new concept as "The most significant step forward in the history of aircraft ignition." That this introductory statement was no exaggeration has been amply demonstrated by the wide and ready acceptance of Bendix low tension systems by America's most critical buyers, the airline operators all the nation.
- **Copilot pay formula** includes the new formula is retroactive to June 1, 1950.
- **Copilot pay average** should not exceed \$1,500 a year on American Airlines under the new formula, the board estimates.

But a check by AA co-pilots of what their new pay scale would be under the board decision reveals, according to ALPA, the average co-pilot in the 127 month June 1, 1950-June 1, 1951 would get a sum of pay under \$1,000 instead of about \$1,500 as forecast by the board, monthly salary range shown as a sample chart: By AA co-pilots there would now make an average of \$450 to \$625 a month depending on flight time and plane.

In his last five years, the copilot would make \$1,500 less than the flight engineer. Starting pay as co-pilot at \$350 a month is less than that for the bus driver at a leading airport bus company, under the new formula, a flight captain flying the big DC-6B 38 hours a month, 4 night and 4 day, will get \$35 more than before but have to be

the equivalent of one more flight N.Y.-Chicago, or more on extra duty work for an extra \$25.

- **More vacation time** goes to all pilots.
- **Other benefits** include more life insurance pay guarantees, improved sick leave, further relaxation for pilots with two or more years' seniority, and increased rental allowances.
- **A no-strike clause** is recommended by the board.

• **Fixed guarantee machinery** should also be set up by the airlines and pilots. This would provide arbitrators to make use of impartial settlement of disputes during the life of a labor contract, especially for scheduled guarantee over demands and interpretation of the contract.

• **"Forgotten Men"**—The co-pilots are "forgotten men" in airline pay scales today, the board says. They do essentially the same work as their first pilot counterparts, but get about half the salary. Since 75 percent of AA co-pilots have taken that pilot pay schedule, AA average for co-pilots in 1950 was about \$6,500 compared to \$13,500 for pilots. This year, average AA co-pilot makes only \$5,500, as American has taken on a lot of novices, who get less.

The union has its chief demand—"salary increase determinants." That would set rates based instead of hours as the main pay determinant. That would limit planes would enable the pilots to fly less hours for the same pay, and fly less hours all told per month.

The ALPA formula would reduce current hours flown per month from the present 95-hour-month to 70-hour-month, 21 hours, DC-6-68 hours and a 100-hour per airline-68 hours. The board said current hours are short

enough, and the President has called on all airlines to produce more and work longer hours in the national stabilization.

The first pilot pay increase recommended by the board is a result of a recommendation—equating gross weight total from hourly pay component and computing it on a weight line—instead of a bracket method. Result: \$27 a month more for a Captain 740 captain, \$16 for a DC-6 captain.

• **Industry Wage Pattern**—Many of the most airlines have signed not to enter the American Airlines dispute's outcome. The Presidential Emergency Board's recommendation now is the first word, labor unions say. The pilots threaten to strike at the end of the 30-day "cooling off" period. But the present national guarantee makes a long strike against the board ruling unlikely.

The dispute started two years ago on expiration of the American ALPA labor contract July 1949. Setting up of the emergency board Jan. 15, this year avoided a pilot strike. The board is the last resort in transportation disputes, under the National Labor Act.

• **Co-Pilot Pay**—Here is the board's recommendation for AA co-pilot pay per month:

First year, \$350, second year, \$400, starting the third year, the co-pilot should get flight pay computed just as the first pilot—except that the co-pilot flight pay shall be 75 percent of that of the first pilot.

Also starting the third year, co-pilots shall have a monthly guarantee of base pay per pilot of hours' flight pay as the type of equipment they are currently flying. Here, after the second year shall be: third year, \$350, fourth year, \$400, fifth year, \$450, sixth year, \$500, seventh year, \$550, eighth year, and thereafter, \$600. On promotion to first pilot from co-pilot he shall continue to progress on his existing base pay scale.

• **Flight Pay**—The Emergency Board says the present and recommended weight and speed formula for airline pilot flight gives him a fair share of products or services.

Here the board: "The present formula is such that it, as justified by the motion, 100-hour per plane should be agreed, the captain would earn over \$10,000 a year."

• **Block-Booked, Speed-Pay** pilot formula. This is the block-to-block speed, scheduled or actual wherever it occurs, judged by emergency board for figuring pilot flight pay on block-to-block time, scheduled or actual, which cost greater.

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manager. Check job & sales promotion in 90 EAL, let this:

► **Independent Military Air Transport Assn.—First** meeting of IMATA, an association to handle military traffic for its members, started the following officers: President—O. Roy Cobb, Texas; Secretary—Therese J. Staines, Missouri; Treasurer—Joseph A. Reley, Missouri.

► **International Air Transport Assn.—International** air traffic transactions of the IATA Clearing House gained 35 percent over a year ago in the first quarter. Turnover was \$35,016,000. Month turnover of \$11,947,000 is 35 percent over March, 1959.

► **National Airlines—NAA** has asked CAB permission to serve Niagara Falls and Niagara, N.Y., by Pacific Express Airline. NAA, also now CAB to let it serve Norfolk, on the same flight as Richmond, Washington and Baltimore.

► **Northwest Airlines—NWA** has set up an Alaska line of its own for passengers and cargo in its base line from Wild-Chandeleur Field, Tern Cities.

► **Pacific Northern Airlines—PNA** has started the first daily service to the King Salmon and Hazel Bay areas of Alaska, the company says.

► **Pan American World Airways—PAA** has asked CAB permission to serve Genoa, France; Morocco; Casablanca would be a stop between London and Dakar on PAA's New York-Johnsonville route.

► **Philippine Air Lines—PAL** some 12 percent of its U.S. passenger bookings in February on April from San Francisco were round the world tickets. The April round the world bookings were more than double those of March. Average cost is \$1,700, itinerary 5-6 mo.

► **San Francisco Air Lines—SAL** reports and departures through SF airport in April: western 1,476, a 12-percent gain over a year ago. January passenger load was 15,618—a 35 percent gain, outgoing passengers were 17,410—a 12-percent gain.

► **United Air Lines—UAL** has issued an August rate on 26 round-trip, California-Washington, D.C. Pasadena W. A. Patterson says he thinks the "united fare plan" probably indicates more people to air travel than are usual. Says Patterson, "at least benefit from professional travel." Statistics indicate on the Hawaiian rates is 49 cents a day. Patterson says the present load factor at 52 percent means greater frequency of service would not help drastically. Sales promotion is the answer.

AVIATION CALENDAR

June 21—Sixteenth meeting of the Asia too division, Society of Mechanical Engineers, Royal Tech Hotel, Toronto, Ont.

June 15—Sixteenth Western Assn., course text, Hotel Commodore, New York.

June 21—Sixteenth meeting of the Asia too division, Society of Mechanical Engineers, Royal Tech Hotel, Toronto, Ont.

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REPAIR
AUTOMOBILE
FLOW
AND
CRUISE

WHY
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HANSEN
COUPLINGS
GIVE BETTER SERVICE
LIST LONGER

QUICK
CONNECTION
DISCONNECTION

Link-Proof
Malware Water
Locking Device

Integral
Factory-Assembled
Taper-Proof
Lock-In-Head

PICK GENUINE HANSEN COUPLINGS FOR HANSEN PERFORMANCE...

• To ensure a Hansen coupling, you must push the plug into the socket with one hand while the other hand is on the handle. This ensures an airtight coupling. Hansen Flow is clear of moisture and automatically.

While for safety, please wear your seat belt and use proper driving technique.

SIZE	TYPE	PRICE	WARRANTY
1/2"	STANDARD	\$1.50	1 YEAR
3/4"	STANDARD	\$2.00	1 YEAR
1"	STANDARD	\$2.50	1 YEAR
1 1/4"	STANDARD	\$3.00	1 YEAR
1 1/2"	STANDARD	\$3.50	1 YEAR
2"	STANDARD	\$4.00	1 YEAR
2 1/2"	STANDARD	\$4.50	1 YEAR
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On the other hand, I want to make it plain to the American people that we cannot do this until we change the present state in view of the world situation, in view of the strength of our strategic air force, in view of the difficulties we live in Korea, in view of the world global situation. I do not recommend it.

I do not see, however, if it is not said it is understood that our mind is completely fixed and could not be shifted in case there is a change in the world situation. What that change could be I do not envision at this time, but I do envision that there is a possibility that it would change.

That was all I meant, sir.

Closing the Gap

RUSSELL: Do I understand that despite our current program, very considerable, that the disparity between us and Russia is an increasing rather than the gap being narrowed by our efforts?

VANDENBERG: No, sir. I believe that the gap is in process of being decreased, but the difficulty in this problem is somewhat in its state, like this:

They have the initiative. They can, when they decide, or if they decide to move, they can pick a date which is advantageous to them, and a place or place. The United States, on the other hand, has to be equally ready at all places, and from now on out.

RUSSELL: Well, what I am driving at is that I desire to notice, rather than our position, is that Russia is in the air of our Air Force is concerned. What steps can you take to equal this capacity at Moscow? Do you think that we are taking all the steps that we can, as should, at the present time, or what else is necessary? I actually don't want to have that measure come when our Air Force will be deficient.

VANDENBERG: May I divide that into two parts?

RUSSELL: Yes.

VANDENBERG: In the first place, I think that the American people have the greatest opportunity since the days of President Theodore Roosevelt, where I believe he said, "Only war, but only a big risk."

Today, the United States has the opportunity of carrying a big risk, and this war, but people will realize that that big risk is the defense strength of the United States Air Force.

To do that, instead of a big risk, it is a fairly large risk, but however, it is likely to be a well-rewarded risk. As a result of the threat, in form of losses, and the development of atomic weapons increases, the job of the United States Air Force becomes rapidly doubled.

Whereas at today it is a deterrent to us, because of its ability to demolish the industrial potential of any great nation on the globe, tomorrow, if the Russians as have, but the atomic bomb and the ability to deliver them, we have to have an air force that can take the action that would be necessary to destroy them on three, and destroy it promptly, and after that, have a sufficient air force left to destroy the manufacturing potential of Russia, and to do what we call bombing action after that, to insure that it was not a vicious thing.

Therefore, what today we have a fairly large risk, in the United States Air Force, that tomorrow, when the date at which they will have sufficient atomic bombs, and aerial to deliver them, we will still have, in my opinion, a sufficient air force.

RUSSELL: Well, why say it is lower? Is your statement to be construed as a warning to the American people that we are not in any wise in providing the Air Force with the essential weapons of war and the new to come there, or is it a position of gloom for the future that the situation is so up in such a way that we can't hope to win it?

VANDENBERG: Thank you for bringing that point to my attention, Senator Russell. I didn't indicate that we wouldn't

have it or that we couldn't have it. I meant to indicate that we must have it, but that it is going to require a greater Air Force than we have planned today.

RUSSELL: We are planning a greater Air Force? **VANDENBERG:** The planned Air Force, as I believe I indicated previously, goes as far as the fiscal 1951 and supplementary budgets. That is all that I can speak freely about. That is built upon the premise that the goal that we set for us is 95 groups sometime in 1952 or the spring of 1953.

In my opinion, that goal of 95 groups is a very strong toward the Air Force that I was speaking of that we must have at the time they have the atomic capabilities that I have just spoken of.

RUSSELL: You further stated that you thought, I believe, I don't want to put words in your mouth—that it was your opinion we were doing short all we could put now, at this present time. So in actual construction it amounted, that is.

VANDENBERG: From the fact at which we started, Mr. Chairman, the fiscal '51 appropriations were short as much as the industry and the facilities that could be provided within that length of time—it was the amount of money that we could spend legally and efficiently. In 1952 the situation becomes different. We are because of the low cost which we are now shifting from, because of the fiscal '51 funds, we can now spend in '52 a great deal more money.

Therefore, you are asking more rapidly and more quickly the Air Force over the 95 groups, but not within the length of time that the '51 funds were appropriated for.

In other words, nothing you can do today in the way of money now meant in getting our more groups before about December of 1952. That money spent in fiscal '52 can get you more air power in 1953.

RUSSELL: The point I want to make is that if the American people put their hands to this bill, there is no reason why our strength as compared to Russia's should not grow progressively greater within this time, is that?

VANDENBERG: Mr. Chairman, that is my opinion, it should.

RUSSELL: That is fine. Now, you discussed here—I assume some of it was written by Admiral Doolittle—some kind of Russian plans. The point back to these are considered obsolete or outmoded by today's standards, and they, General Vandenberg, in any other kind of our own plans, that matter, whether they are or not.

VANDENBERG: Senator, it is very difficult to have at any one time an Air Force that is completely modern in the way that they are all equipped with the very latest type, (delivered). They are building a language at this

Guns and Butter

JOHNSON: Of course, General, do we have the air power to give American rivers a reasonable defense against atomic attack, in event of a war with Russia? Vice President.

VANDENBERG: Today, yes, sir, but not complete security.

JOHNSON: Do we have a sufficient air power available to carry out our commitments to Europe?

VANDENBERG: Today, yes, sir.

JOHNSON: Do you think we will have, under the program that has been submitted?

VANDENBERG: Well, Senator Johnson, the program, as proposed, is a building program, provided that all of the resources that are going to contribute toward us power, including the United States, all left their rights to 95 groups to perhaps 134 percent—that we will meet the total air power part of it.

The strategic effort is today today. Later it will not, not correct by any stretch of the imagination, be made adequate until sometime later in the future acquisition of how

When General Vandenberg told Senator Connally he felt that Russia is not about to start a war or even that they know about them, the Texas senator had his own assessment of them.

"Well," he said, "it seems to me that there is a problem for our government, in either they have more weapons about atomic attack, or find out about that thing."

"It is a pretty hell polar point when you follow a string there with a hand you can see, and another one, you can't see."

That looks to me like that is our trouble. Instead of spending as much as the Soviet America, we might spend a little as the Soviet of Russia and find out what they are up to."

much money we might have put into it as fiscal year 1951? **VANDENBERG:** Are you satisfied with the rate of progress of our air program, sir?

VANDENBERG: No, sir.

Do you think we have at our right high enough in the light of current international issues.

VANDENBERG: To answer that, Senator Johnson, I must say that the Air Force thinks consider that the 95 group program is simply a stepping stone toward the goal that we believe is necessary.

We are proceeding, to the 95 group program as rapidly as is possible under, in some cases, part of it, the present 95 group goal, 93 percent better.

JOHNSON: General, how many air groups do you think the Air Force would need to carry out its present combat missions, including the defense of our Far Eastern bases (the defense of Western Europe) as well as the defense of the United States, and the strategic air effort?

VANDENBERG: Well, Senator, what we are talking about is something that will take, regardless of how much money you put into it and a half to three years to accomplish—regardless of how much money you put into it.

Therefore, that comes up in the part that we are going to attempt to achieve in the '52 budget and the '53 budget and in the '52 appropriation. Since that is a job that ought to be done, let me say, finally, I would like to ask you in judgment to have it properly prepared through the House of Representatives and the Defense Department and the Bureau of the Budget so that this will not be used after being put by me as a working board for an appeal for more money than I have even discussed yet within the Defense Department.

JOHNSON: Oh, that, thank you, you are sure that the 95 group figure is actually inadequate in the light of our commitments and our responsibilities?

VANDENBERG: The 95-group program is the interim program only (delivered).

JOHNSON: (After) I am quite certain that we in this country are the only one to be placed with our military and naval armaments program, including almost every condition program, at a much faster rate than we have done so far.

VANDENBERG: I believe that I would like, in so that anything that we do to speed up the build-up of the United States Air Force toward the 95 group level and later on beyond that should be accomplished with as much dispatch as possible.

As this time I would like to put in a few rapid notes on the 114 which are in progress in public works (delivered) because I think we are all going to look at the building of an air force as something of the universal production from aircraft factories, the fact that we have ships, landing and takeoff strips, in the United States, available but in most instances no short, but without adequate to serve the

own in greater quantities to train them, and they after they become capable enough to leave them with proper constructed facilities.

In other words, in my opinion, we must not bring the people into the United States Air Force or any other branch of the service and make them for a period of time to live in an atmosphere of such low-level production that the entire state of being of the United States is going to be affected by it.

JOHNSON: (After) Are you getting the over five year or less? As I understood it, you are building up something over \$600,000,000 in something over a million. Are you giving them such as that you can take care of these men only and efficiently?

VANDENBERG: No, sir, there has been more delay due to public works money that had the Air Force, obtained from another, greater number could have been taken care of and greater numbers could have been taken care of.

On the whole, the public works requirement goes hand in hand with the movement of airplanes and people.

JOHNSON: Are you getting the planes in but in your view this?

VANDENBERG: No, there is a gap in a certain percentage of which is probably short, but others of which are caused by difficulty of getting raw materials and getting parts.

JOHNSON: Yesterday you said something about the progress of 30 percent gain and 70 percent better. Do you think that the percentage should be changed?

VANDENBERG: Well, Senator, I would like to qualify my reply by again stating that there are many considerations other than the military that I am aware of, but from a military point of view, I would certainly advocate changing it.

JOHNSON: Are the aircraft production people operating as efficiently and as honestly as you think they should, or do you think we should intensify our efforts to step up our plane production over and above what we are now doing?

VANDENBERG: I believe that everything is being done to the extent that is possible and that the most production people, hands to speed up the production of aircraft. I believe they are having difficulty in obtaining materials.

JOHNSON: Now we have been talking a lot in these days about the time we are beyond our ship. We do not have enough planes to start on the MacArthur program that if we decided it was the worst move, we would have to double our strategic air strength to regenerate the air recommendations, and we would probably have to increase our fleet in order to carry out the naval recommendations.

Now this kind of operation or observation that I would like to comment on. If we are having time, it is important that we use that time and we use it advantageously. Are we doing that, in your judgment?

VANDENBERG: I would say in reply to that, Senator, that we are not going ahead by a long shot.

LONG: (After) What do you think of the theory that we should fight a war from the production line? Do you believe that we can depend on the materials being produced while the war is being fought or do you think that it might be better to be in a line to a large storage base in the beginning, particularly in terms of equipment?

VANDENBERG: As far as air power is concerned, Senator, I very much doubt, after success of such destruction as available and means to destroy them, if you will have an opportunity to do anything but to have our own defense force in being at the date at which our will need it.

LONG: So far our experience has been that we have had about a year's notice from the time the Korean war broke out and I've had a lot of time to do so in the way of

ing Russia or advantage, do we not, at least in some degree, at all?

VANDENBERG: I believe that I could say that we have a way to go in some phases. In other phases we are ahead and in some phases we are behind. In the overall we are starting from a position in that only the advantage of our having a majority of Atlantic and the means to deliver them today in the environment factor which makes it an our favor.

LONG: We are told by Mr. Wilson that we can expect about 1943 at the rate we are going to have a considerable amount of security. I take it you are in agreement with that.

VANDENBERG: Not exactly, Senator. No feeling is that the danger period begins from today until about 1954 and in any action in 1953 we will be beginning to have an adequate military position. I would say not that in 1955 everything would be done by a long shot.

LONG: You think that appropriations are in any way degree the problems of the Air Force, as far as giving an adequate preparation is concerned, or do you feel that at the present time the money seems to be no particular object as far as getting the job done?

VANDENBERG: I would like to state it this way, if I may, Senator. That the basic appropriations of fiscal year '51 and the various supplements in '51, the Air Force was given enough money which in my opinion it could efficiently spend for the purpose. I would like to make the point though, that the time that money was made available to the Air Force was such that greater efficiency and much greater progress could have been made had we had it earlier.

LONG: I just wanted to get some idea as to how much you think it might help if you simply had no strings at all as far as money is concerned.

VANDENBERG: Well, up to this time, I would say, nothing from a big money Air Force and saying that nothing could have been done previous to this time, that it would have made a difference mainly in our public works program. It would have made the planning for following fiscal years much easier. It would have moved the industries that are required to manufacture to have steady, firm programs that they know for several years ahead would be maintained. It would enable the Government to establish its more nearly and confidently state from a base which is larger and which in my opinion, there is today almost the feeling that if we extend there and it is cut off, somebody has built a monument and who is responsible? Which tends to limit the efficient going about of this program.

The Dispersal Question

LONG: General Vandenberg, I found a statement by you earlier in your testimony that you believed that we had sufficient air power and sufficient strategic power to pretty well knock out Russian industry in the event we had to fight them in a third world war, something to that effect. Is that right?

VANDENBERG: Today, yes, sir.

LONG: It would be my guess Russia would be dispersing her war plants another in the possible cold, knowing that we have a great number of atomic weapons. Do you believe, do you have any information to indicate that she is doing that sort of thing?

VANDENBERG: The information I have is that they are heavily well dispersed, yes, sir.

LONG: Do you believe that notwithstanding that, you could adequately pay back, your means of knocking out some of their war plants, if it could be done today.

VANDENBERG: I believe it could be done today.

LONG: (After) . . . It is not true that our industries that could produce the essential materials for war are very concentrated in certain localities?

VANDENBERG: Yes, sir; I believe that is true, Senator.

LONG: Do you know the estimate of Russian defense and what they believe the Russians probably have and how they think the Russians could be expected to use the atomic weapons they have available?

VANDENBERG: I don't know the particular study you have reference to.

LONG: I am sure you have had called to your attention at least, in the context of the Air Force, would suggest to America industry in the early stages of an atomic war?

VANDENBERG: Yes, sir.

LONG: Do you believe that there is a danger of this nation's being crippled industrially for some time to come as a result of an early attack?

VANDENBERG: I believe, as I said previously, Senator, that we are relatively safe today. Tomorrow, I think that we are in great danger.

LONG: Do you believe there is a need for further dispersal of American plants to produce various essential materials for war purposes?

VANDENBERG: Well, Senator, that gets into an awful lot of difficulties in that it is very difficult to give a one-paragraph answer to it. I might highlight some of them without giving you a definite answer, to show you what the thinking in the Air Force has been over this date.

"If you concentrate your industrial area, and you adequately defend it, and it is moved far enough from your advanced warning system, it is obviously going to require fewer aircraft to defend it, and your air warning net can be more heavily made. It can make faster, and there will be fewer holes in it."

On the other hand, if you disperse it, you have got to furnish through the length and breadth of the United States that more defense, and you ought to have it in the case of the fact that you have it in the area where you have it concentrated. Therefore, it becomes a question of cost, efficiency and similar problems.

Additionally, when you disperse your industry that makes certain difficulties between some of the components. Now, the Germans dispersed and massed their industry while the war was in progress, and did a remarkably excellent job. However, the Air Force found out that it also worked to the disadvantage of the Germans, because you made a component over in the northwest, let us say, and it today stands prominent over in the southeast, so you get the aircraft and the fuel and the roads and the bridges out of commission, and they can't get some elements built in the northwest to a component built in the southeast, so as that distance there is another factor that has to be considered, perhaps it is better to concentrate.

LONG: Of course, in considering the factor, you have to keep in mind that it would be a very difficult task for an enemy at long range to bomb our airfields, as we did find a considerable bombing of German airfields.

VANDENBERG: I believe I do connect when I say that the Germans tried and our system was built for war, and it had much back and forth, and alternate routes, that had been very carefully thought out for that purpose, and I doubt if we in this country are very much better off than they were with their track and rail communication systems. All of these roads probably were military roads.

LONG: Yes, then would be best to reconnoiter further dispersal of various industries?

VANDENBERG: I would not be prepared to recommend either far or against it at this moment, Senator, because of the very many things that wait to be taken into consideration. I would think that it would be a study based upon, partly, perhaps, the advantages and disadvantages, both from the industrial point of view, and the military, and in that I would also include the ground defense, the defense against sabotage, and the subsequent utility, as well as the air defense.



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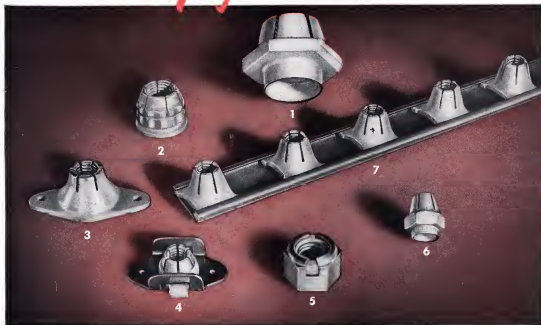
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